IUCEL 2021

INTERNATIONAL UNIVERSITY CARNIVAL ON E-LEARNING

Leading Innovation
Towards Digitalized Community

PROCEEDINGS OF
THE INTERNATIONAL UNIVERSITY CARNIVAL ON e-LEARNING (IUCEL) 2021

UUM · Universiti Utara Malaysia

JPT | DEPARTMENT OF HIGHER EDUCATION

MINISTRY OF HIGHER EDUCATION

MEIPTA

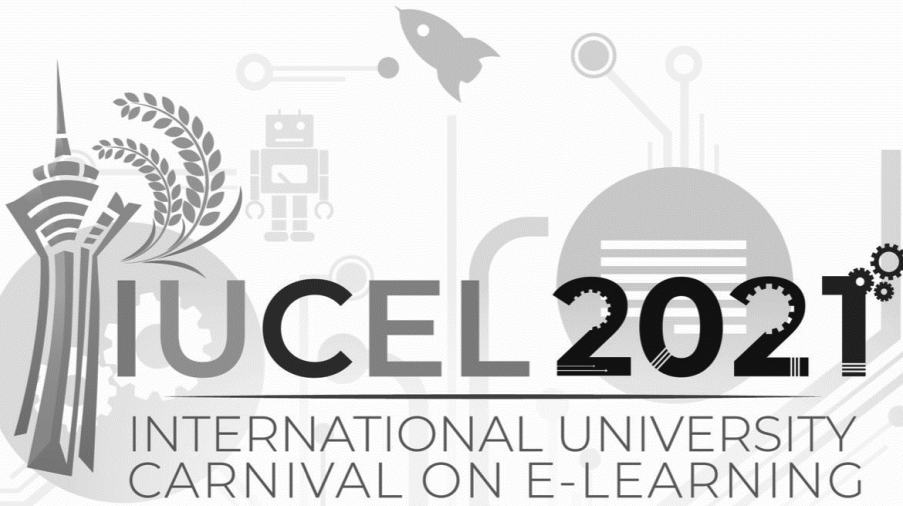Pusat Pengajaran Pembelajaran Universiti · Universiti Utara Malaysia

International University Carnival on E-learning (IUCEL 2021)
University Teaching and Learning Centre (UTLC)
Universiti Utara Malaysia, 06010 UUM Sintok,
Kedah Darul Aman

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Proceedings of the International University Carnival on e-Learning (IUCEL) 2021

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ASMAUL HUSNA MOBILE APPLICATION

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Highlights: Signaling principle makes people learn better when cues that highlight valuable materials are added. Therefore, this study is carried out to determine the effect of the principle in Asmaul Husna mobile application (AHMA) among Muslim on knowledge, perceived awareness, and perceived motivation. As a contribution to the body of knowledge, this study will contribute to the Cognitive Theory of Multimedia Learning (CTML), Signaling principle, Islamic content, and Islamic mobile application. It will also contribute to the design and development of Islamic multimedia learning applications, AHMA to educate Muslim about Asmaul Husna by hybridizing Signaling principle and Nielsen's design guideline. The study is classified into quantitative category and utilizes quasi-experimental approach using pre-test and post-test factorial design, and the design and development phase in this study is governed by Alessi and Trollip Instructional Design Model.

Keywords: Islamic mobile application, asmaul husna learning, Signaling principle, Nielsen's design guideline

Introduction

In the context of education, a paradigm shift is necessary for this mobile technology to succeed. Some suggest that parents and teachers need to encourage children's learning via mobile phones under their supervision and monitoring, while others concern on how mobile learning might not be suitable and can cause unnecessary extra works for teachers (Ariffin, Dyson, & Hoskins-McKenzie, 2012). As nowadays learning is accessible via mobile phones, desktop computers, and laptops, mobile learning is an excellent initiative as it offers flexibility, luxury, and an effective way of learning for generation Y and Z (Chee, Ibrahihm, Yahaya, Surif, Rosli, & Megat Zakaria, 2017). It will also benefit many parties, especially digital users, who enjoy more interactive and personalized experience through SMAC (social, mobile, analytics and cloud) technologies (Selamat, Alias, Hikmi, Puteh, & Tapsir, 2017) and also embrace the MOHE's vision of Higher Education 4.0 which is to create heutagogy (self-determined learning), paragogy (peer-oriented learning) and cybergogy (virtual-based learning) (MOHE, 2018).

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Content

Asmaul Husna Mobile Application (AHMA), the prototype design consists of three main phases - planning, design, and development, and this is based on the Alessi and Trollip Design Model. While the Constructivist Learning Environment (CLEs) is utilized as an environmental design strategy.

Asmaul Husna learning is selected as the context of this research as knowledge and awareness on Asmaul Husna is still deemed lightly by the Muslim society as stated by Rosmani and Zakaria (2018), as well as based on the results of the preliminary investigation that have been conducted in this study (Rosmani, Abdul Mutalib, & Sarif, 2018). What public are not aware of is that Asmaul Husna contains beautiful meanings that can be used in everyday life either as a supplication or dhikr (Ab Rahman, 2016; Al-Qurtubi, 2017; Nik Mat, 2016; Wan Mohd, 2015a). This has been supported by Surah Al-A'raaf verse 180, "And to Allah belong the best names, so invoke Him by them. And leave [the company of] those who practice deviation concerning His names. They will be recompensed for what they have been doing". There is also a hadith narrated by Abu Huraira in Bukhari, Book 8, Volume 75, Hadith 419, Allah has ninety-nine Names; one hundred minus one, and whoever believes in their meanings and acts accordingly, will enter Paradise.

Referring to the stated verse and hadith, it is revealed that Islam has emphasized the importance of appreciating the names of Allah SWT in the entire Muslim life. This is because, as a vicegerent on earth as defined in surah Al-Baqarah verse 30, it is necessary for Muslims to absorb 99 Names into the heart through repetitively mentioning them (dhikr). This process will eventually create a balanced, emotional, spiritual, physical, and logical individual (Alkumayi, 2009; Sabirin, 2014). By mentioning Asmaul Husna repeatedly, it will strengthen one's faith, because trust in God is one of the fundamentals of faith, with that, one would not lose his trust during misery (Al-Qurtubi, 2017). It is also undeniable that it could deliver a significant impact on human life such as bringing truth and happiness to humans as well as good behavior (Hamat & Shuhari, 2010; Shariat & Puji, 2016; Utami, Susanto, & Irvan, 2018). Therefore, the understanding and appreciation of the beautiful names of Allah SWT is essential in developing a balanced, virtuous, faithful human character (Hamdi Rahman, Sofian Sauri, & Nurul Naim, 2012; Haris, Ahmad Kassim, Yusof, & Ahmad Kassim, 2011; Wan Mohd, 2015b; Yousef, 2018).

The content experts in this research have agreed that the development of Asmaul Husna mobile app (AHMA) is very significant for Muslim community and mentioned that the mobile app is very convenient as it can be carried anywhere and access anytime. The guidelines that have been developed from this research should also contribute to the fundamental design and development for future Islamic mobile application.

The mobile application could be dispersed through website for any person with a certain amount of fee. Furthermore, the hybridized design guidelines could be added as a commercial value as it has been tested and validated by users and experts. From this research, 3 publications have been issued in conference proceedings and SCOPUS indexed journal.

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MySejarah SPM Application

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Highlights

The mobile learning application named MySejarah SPM targets the students enrolled in secondary school that take History subject. The main purpose of MySejarah SPM application is to simplify the learning process to be more interesting, collaborative and effective. MySejarah SPM derived from the FRAME model for m-learning proposed by Koole which focuses on device aspect (cybergogy), learner aspect (heutagogy) and social aspect (paragogy). The marketability of MySejarah SPM can be targeted to students that will take SPM exam, teachers that teaching the History subject, publishers that publish History subject e-books, and trainers or tuition instructors that conduct History lessons.

Introduction

The description of our innovation on mobile learning in education is a mobile application named "MySejarah SPM" for Form Four and Five secondary school students that are going to sit for *Sijil Pelajaran Malaysia* (SPM) to explore and expand their learning virtually beyond the walls of a class building. The issues of students in learning Sejarah are they easily get bored; the notes are too complex and misunderstanding on the occasions of history is misunderstood. From the teachers' perspective, some find the subject History is hard for students in memorising or even trying to understand the chronology of important events. In order to make the students feel curious and interested towards the History subject and providing a platform for teachers to conduct History class in a more interactive and interesting way, the MySejarah SPM application is able to make things easier for both the students and teachers by focusing on collaborative learning. History should be taught in two ways communication based on the storytelling method to make sure students get involved and not boring. Based on that learning method, the application included a mind map for every chapter, video learning, game quiz, and a forum for the students and teachers to interact. The background of this innovation is derived from Koole's FRAME model that consists of device aspect, learner aspect and social aspect.

Using this application will make the learning process easier, faster, and flexible because MySejarah SPM is accessible anywhere and anytime with low data usage (device aspect-cybergogy). MySejarah SPM also able to provide a personalized learning experience that is

appropriate to the level of the student's individual achievements (learner aspect- heutagogy). Instead of that, this application is also able to summarize large and complex teaching materials from teachers into something easy, accurate, and interesting for students to understand. As a result, it encourages more collaborative learning between (1) students and students and (2) students and teachers, that make access to relevant information that excites the students' curiosity in knowing and learning more about History in a modern way (social aspect- paragogy).

The MySejarah SPM is important to education because it is a mobile learning (m-learning) system that makes it flexible for the students to keep on track even when they cannot attend the class lesson. Secondly, it encourages the "flipped classroom model" to be implemented as students and educators can have the discussion at anytime and anywhere. The advantages of MySejarah SPM are promoting collaborative learning, help users in accessing more information towards the subject, increases accessibility with people and promote the modern way of education. The next sessions will explain more about the application.

1. Description of your innovation / product development / design / process.

Target users of the application are the SPM students enrolled in secondary school, that take history subject. There are five phases for the design and development of a mobile learning application as illustrated in Figure 1.
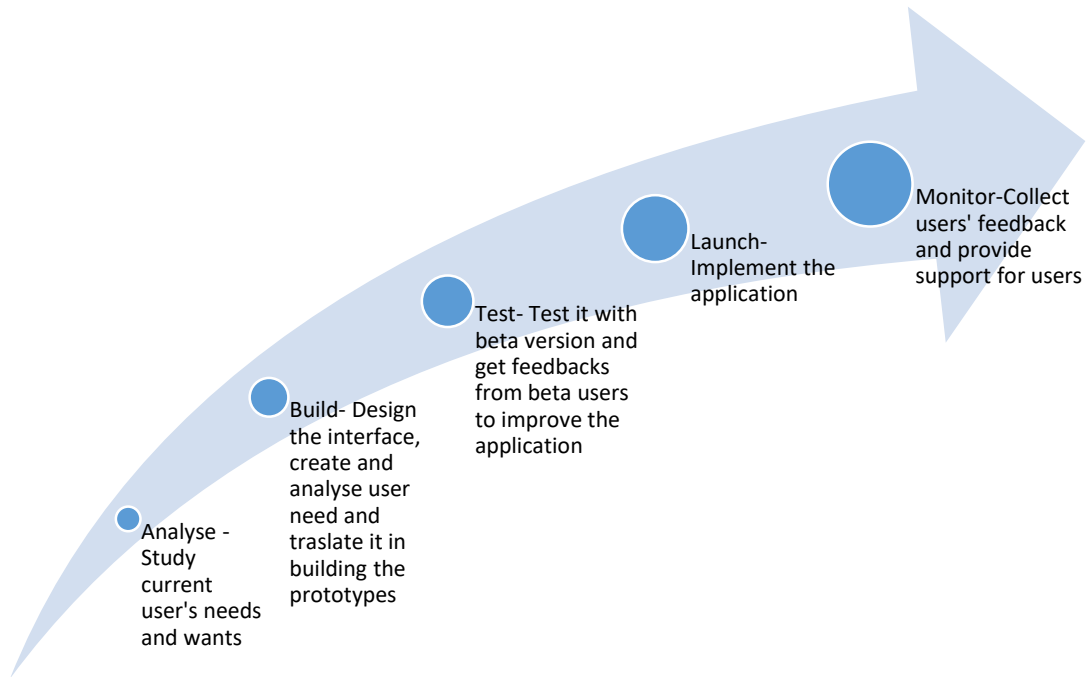
Figure 1: Development process for mobile learning application- MySejarah SPM

| Mind map for the chapters | Insert video regarding the specific topic. For example video to describe the events on the colonisers such as Japan occupation in Malaya | Design quiz to test the understanding of user regading the studied topic | Integrated Forum- to enhance collaborative learning between users and peers and between users and educator |
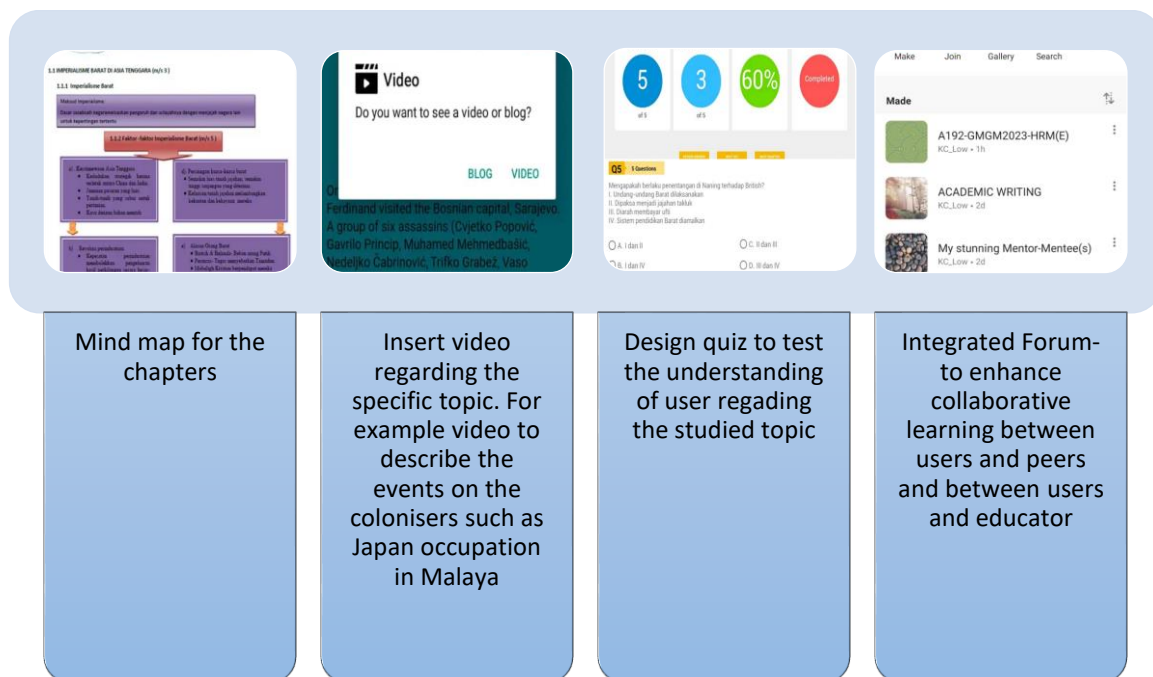
Figure 2: The idea's flow for designing MySejarah SPM prototype

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What is the context or background of the innovation / product development / design / process?

The prototype of the application- MySejarah SPM is derived from the FRAME model for M-learning proposed by Koole (2009). The Koole's FRAME model, as illustrated in Figure 3, describes m-learning as a "process resulting from the convergence of mobile technologies (device), human learning capacities (learner) and social interaction" (Koole, 2009 p. 25). As a result, the intersection between two aspects will form attributes (device usability, interaction learning, and social technology) that frame m-learning and thus becomes essential to identify students' mental preparation towards accepting m-learning and devices to support the learning environment. There are three main aspects for FRAME model, which is, first device aspect refers to the physical, technical and functional characteristic of mobile device; second, learner aspect refers to individual's cognitive abilities, prior knowledge, motivation and emotion, and finally, social aspect that take into account of the processes of social interaction and cooperation. Based on FRAME model, effective mobile learning is the results from the integration between the device, learner and social aspect. Effective mobile learning process enables the learner better to assess and select relevant information, redefine their goals, understanding the concepts with a growing frame of information provided, and enhance the interactions among learners and between learners and instructors on course materials in physical or virtual environment.
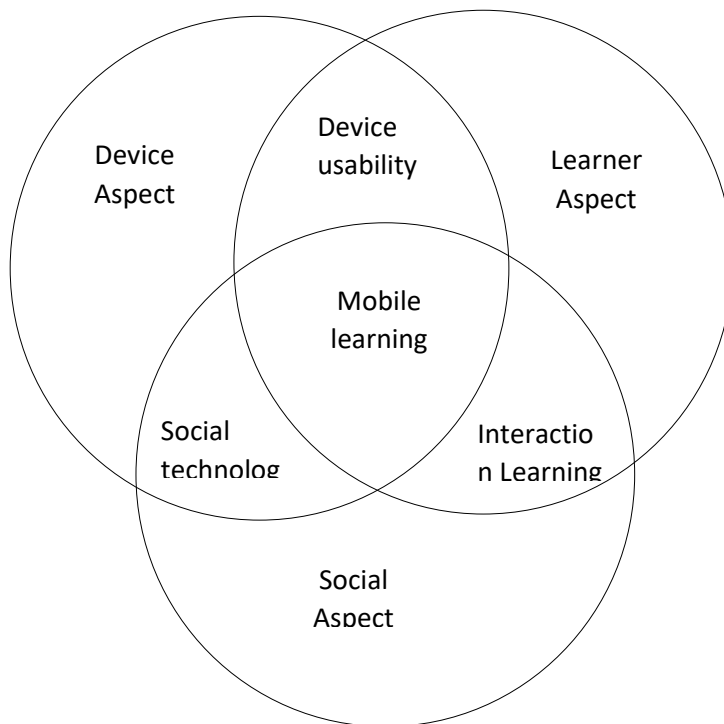
Figure 3: The FRAME Model for m-learning

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In this project, MySejarah SPM prototype design based on the three main aspects stated in FRAME model, which are device aspect, learner aspect and social aspect.

Device
- Design mobile application settings that focus in 6 technical areas
- user interface, functionality, reliability, usability, efficiency, maintainability, portability

Learner
- Use contextual cues and multimedia (insert video) to provide variety stimuli to assist in improve comprehension and memory.
- Use mind mapping (advance organizers) to emphasis the main points of the topic and this enable user understand topic quickly.

Social
- Integrated forum- to enhance collaborative learning between users and peers and between users and educators

Figure 4: The FRAME Model aspects for MySejarah SPM

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2. Why are they important to education?

Mobile learning (m-learning) refers to the learning via mobile devices such as PDA, mobile phones and laptops that enable learning anywhere and anytime (Mcneal & Vann't Hooft, 2006). M-learning is the subset of e-learning, and this is a new paradigm that offers as a new media for learning initiative. Mobile devices becoming viable and it is compact and can be transported easily (Mellow, 2005). According to Brown (2005), m-learning is a subset of e-learning that offers distance learning (refer Figure 5).
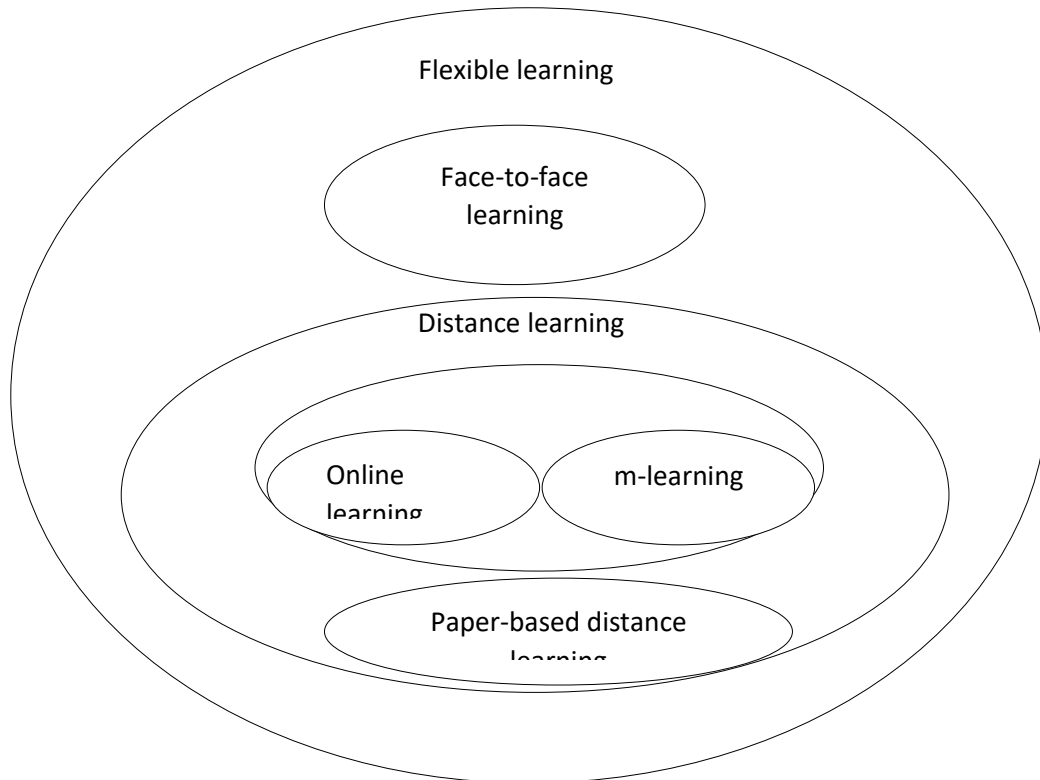
Figure 5. M-learning model

Our contribution in developing this product (MySejarah SPM) is that it helps in breaking down large and complex teaching materials into a smaller piece and makes it more precise to a particular subject domain. In this regard, it assists students to learn the lesson in a shorter period. In addition, the accessibility of the mobile phone is more affordable and easier to carry anywhere anytime, and this motivates students in learning because of the easy access and timesaving. For example, students able to study while travelling on the bus, while waiting for his/ her friends. Shuler (2009) annotated that m-learning provide a personalised learning experience with customised lesson according to student's performance level. For instance, a student can repeatedly access or drill and practice on a specific lesson topic until he/ she understand well on the lesson content. In this regard, our application enables students to access and take the test to the particular topic repeatedly until he/she understands the content. In addition, to integrate the video and the mind maps on the history topic motivate students' interest in learning history subject.

3. Please write any advantages of your innovation / product development / design / process towards education and community.

Theoretical Contribution

According to Tan, Ng, and Lee (2013), mobile learning or m-learning is developed based on three components, namely paraphernalia, place, and participant. These guiding factors help to determine the appropriateness of pedagogical theories to support the use of m-learning in curriculum design, methodology, and learning assessments. Based on the model as illustrated in Figure 6, "paraphernalia" refers to materials for delivering learning and features in tools that help students to build knowledge by responding and using the mobile devices that are easy to use and sounds practical. Next, "participants" refer to students are "on-the-go" by experiencing physical movements and exploratory communication that promotes collaborative learning. Lastly, the "place" is coined as a learning space that consists of the whole environment instead of four walls classroom that encourages collaborative knowledge building that consists of a distributed system of meaning making. In conclusion, these factors shape m-learning pedagogical theory as the "learning processes (personal or public) of coming to know through explanation and conversation across multiple contexts, amongst people and interactive technologies" (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009, p. 237).
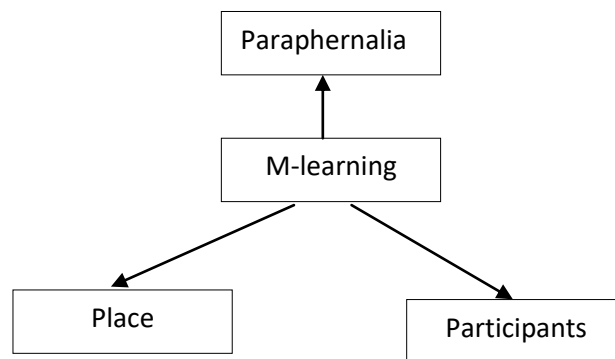
Figure 6: Mobile Learning components

Based on mobile learning components, it has its root on FRAME mobile learning model. Three main aspects, device aspect refers to paraphernalia, social aspect refers to a place (promote collaborative learning), and participants that refer to learner's aspect. The intersection of device aspect, learner aspect, and social aspect contribute to form the mobile learning process. The MySejarah SPM is designed to addresses contemporary pedagogical issues of information overload, knowledge navigation and collaboration learning. It helps learners to have greater access to relevant information, reduced cognitive load and increase learners' accessibility with other

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people and system. In addition, the application facilitates learners to intensify their learning through places and spaces with exploration and conversation across multiple contexts, among people and interactive technology (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009).

Practical Contribution

A shift in the technology paradigm revolutionized the education sector. As the technology evolved, education dissemination no longer confined in a physical classroom but into distance learning whereby learning remotely from point to point without the physical contact between educator and learners through correspondence lesson. Mobile learning deploys "on-the-go" devices such as smartphones or tablets and the dissemination of information and knowledge are far more quickly and conveniently to the learners. The design of MySejarah SPM enables learners' to access to bite-sized learning on-the-go. The application summarises the main points of the learning chapters and presenting it in mind map concept and this enables learners to comprehend knowledge from a chapter in a shorter time. In addition, the application inserted visualised event of chapters in the video, and this attracts the interest of learners in studying the chapters. In other words, the application enhances collaborative learning and promotes engagement of learners in their learning process, Moreover, MySejarah SPM integrates with forum and this promotes interaction between peers, learners and educators. The application provides Interactive learning. Interactive learning is a pedagogical approach that incorporates the use of digital technology to facilitate learning between learners and educator. Learners play an active role in interactive learning, whereby, they are invited to participate in the conversation, exchange information and knowledge with peers and educator.

Current pandemic situation caused remote learning implemented in secondary schools. The situation suggests the mandatory needs to incorporate the use of digital technology in school teaching. MySejarah SPM application helps to promote critical reflection on practices and it provides more interesting virtual interactions with students. This also helps to improve interest in learning and promote self-efficacy among the students in learning matters.

4. **Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.**

The Figure 7 illustrates business plan for MySejarah SPM application.

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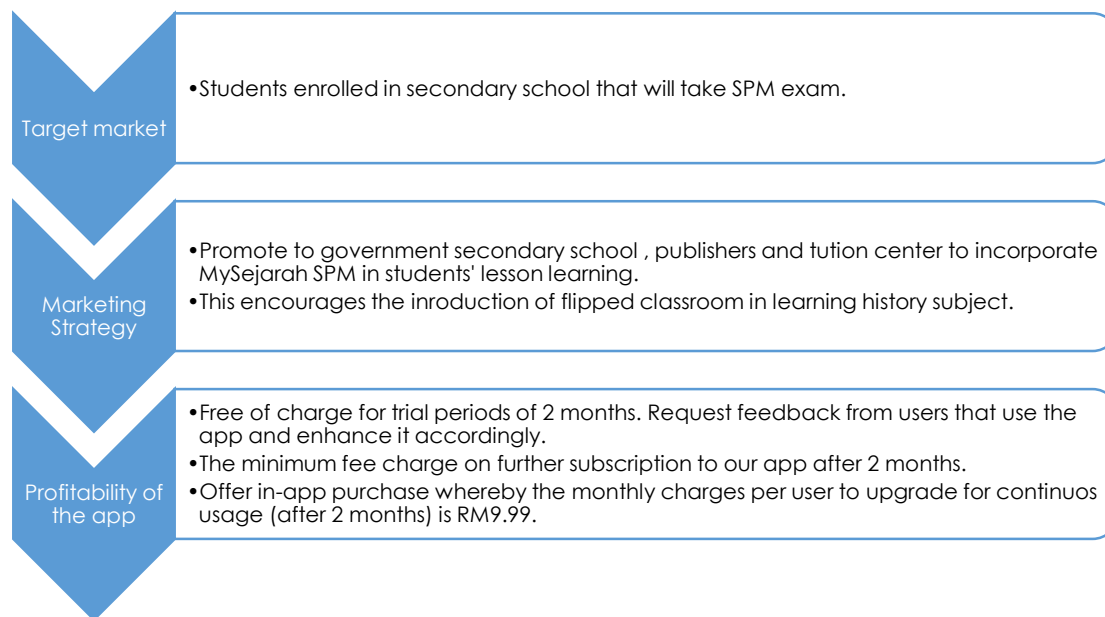
Figure 7. Business plan for MySejarah SPM application

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DIGITAL IMMERSIVE LEARNING EXPERIENCE (DILEX)

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Highlights: Digital Immersive Learning Experience (DILEX) is a transformative teaching and learning strategy that aims to provide meaningful and immersive learning experience to the future teachers through active engagement in digital-based teaching and learning activities. This strategy also aims to make assessment as a motivating and engaging learning process by involving students in an alternative assessment through authentic learning experiences. DILEX are inspired by Create-Share-Collaborate© instructional strategy underpinned by meaningful learning theory within the constructivism and connectivism perspectives. Through DILEX, students engage in meaningful learning activities through authentic tasks (i.e., develop interactive educational game, participate in innovation competition, showcase their product and reflect on the learning activities in an e-portfolio. The impact of DILEX on students learning outcome and achievement are highly positive, during and after the course. Students are able to design and develop innovative and creative teaching and learning products and receive international recognition. In addition, the reflective e-portfolio enable students to develop their soft skills such as digital literacy, information management and life-long learning skills, digital communication and creativity. DILEX can be applied in the curriculum design to prepare future-proof teachers that are able to immerse with the educational and technological transformation. Importantly, this approach to teaching and learning that emphasis on meaningful and authentic learning experience is very important for the development of future-proof teachers who are well-prepared for the complexities of the educational landscape.

Keywords: *alternative assessment, active learning, meaningful learning, reflective e-portfolio*

Introduction

Teachers of the 21st century are expected to be creative, innovative and transformative in the teaching and learning process to align with the needs of the digitalized generation. It is very important to develop our future teachers to be more competitive, creative and innovative in facing the IR 4.0 challenges, such as the disruptive education phenomenon as well as the "open market" education industry. This is in line with the Malaysian Education Blueprint 2013-2015 that highlights the importance of transforming higher education learning into more personalised learning experience to develop students' talent.

The primary objectives of DILEX are:

To provide meaningful and immersive learning experience to the future teachers through digital based teaching and learning activities.
To make assessment as a motivating and engaging learning process by involving students in an alternative assessment through authentic learning experiences.

The underpinning theories

DILEX are inspired by Create-Share-Collaborate© instructional strategy (Sailin & Mahmor, 2016) underpinned by meaningful learning theory within the constructivism and connectivism perspectives (Howland, Jonassen & Marra, 2012; Siemens, 2005). Through this approach, students engage in meaningful learning activities through authentic tasks (i.e., develop interactive educational game, participate in innovation competition, showcase their product and reflect on the learning activities in an e-portfolio). In completing these tasks students are involved in the construction of knowledge and make sense of their experiences by engaging in active cognitive, psychomotor and affective domains through authentic experience and reflecting on those experiences by utilising digital technologies.
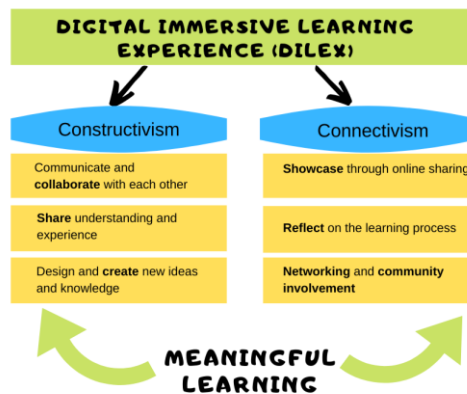
Figure 1: DILEX theoretical framework

Alignment with Course Learning Outcome

DILEX has been implemented in a Postgraduate Diploma in Education course namely SGDT 4013: Technology and Innovation in Education in semester A181 and A191 with two cohort of students. The DILEX project has been aligned with one of the course learning outcome (CLO) in which students should be able to design innovative products for teaching and learning (C6, P4, A4). There are two assessment tasks that students required to fulfil for achieving this CLO.

Interactive Educational Game (30 marks)
Students in groups are to design and develop an interactive educational game of a particular topic / content area.

E-Portfolio (20 marks)
Individual students are required to develop an e-portfolio to share, showcase and reflect on their project and other learning activities.

In completing these tasks, students experience student centred, active and meaningful learning activities through several phases. The phases involved are (i) planning and designing, (ii) development and implementation, (iii) gamifying learning through participation in an innovation competition, and finally (iv) showcase and reflection about the learning processes in an e-portfolio as in the following figure.

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DILEX LEARNING PHASES

Phase	Activities	Facilitation & Assessment	Integration of digital technology
Phase 1 (1 weeks)	Planning and designing • Idea generation • Product title • Objectives • Synopsis	• Lecturer(s) introduced students with the project requirements and criteria. • Students plan and design their project with continuous feedback and suggestions for improvement from the instructors during.	• Augmented Reality, QR Code, and other computer programme or online applications for developing the product. • Canva / Photoshop for designing the gameboard, poster and brochures. • Movie editor for creating product montage. • Youtube channel for sharing videos. • Padlet for group progress. • Whatsapp group for out of class discussion, feedback and support. • Weebly for E-Portfolio.
Phase 2 (3 weeks)	Development and implementation • Develop the product • Prepare exhibition kits: poster, brochure, user manual etc. • Product testing	• Students worked collaboratively within their groups to develop the product and exhibition kits. • Lecturer(s) introduced students with some technology • Continuous feedback from lecturer(s).	
Phase 3 (1 week)	Gamifying learning: Participation in an innovation competition.	• Final preparation for the competition. • Students presented their projects to lecturer(s) for assessment of the final product (mark given before entering the competition to avoid bias). • Additional marks were given to student's project based on their participation and achievement in the innovation competition. and made known to the students earlier and it was stated in the rubric. • **Rubric for Interactive Educational Game.**	
Phase 4 (1 week)	Digital Showcase and Reflection	• Students were to showcase their product and reflect on the learning process and experiences that they had gain throughout phase 1 to 3. • **Rubric for E-Portfolio.**	

Figure 2: DILEX Learning Phases

To suit the nature of the course syllabus and to achieve the CLO, DILEX has been conducted through digital-based teaching and learning activities where students have the opportunity to immerse with the course contents and achieve the learning outcome through the integration of various digital technologies such as Flipgrid, Padlet, Whatsapp Group, Augmented Reality Apps and YouTube Channel. For example, students represent their products' development progress in a Padlet wall to enable sharing and feedback from peers and instructors.

Achievement of Course Learning Outcome

The highlight of DILEX project is on the authentic experiences in which students have to design and develop an interactive educational product and share their creation through showcase in an innovation competition as well as in their e-portfolio. At the end of the course (Semester A181 and Semester A191), the CLO was achieved through the followings.

Development of innovative and creative educational products

Students are able to design and develop innovative and creative educational products that can be used in their future teaching and learning practice. The products or games developed integrated some digital technologies such as Augmented Reality application, QR code and computer programming. In semester A181, a total of six products were produced, whereas in semester A191, a total of 9 products were produced by the groups of students that consist of 4 to 5 members.

International recognition
As to gamify the learning activities, students are required to participate in an exhibition competition to get feedback from external experts and potential users as well as to make their

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product reachable by wider audiences. For Semester A181, students took part in an *International Conference and Exhibition on Global Education (ICEGE)* held in November 2018. Out of the 6 products created and exhibited by the students, 2 product received Gold Medal, 2 products received Silver Medal and 2 products received Bronze Medal in the exhibition competition. In semester A191, another group of students that enrolled for this course took part in Sintok International Game and Gamification (SIGG). Out of the 9 products, 2 products won Golds, 2 won Silvers and 5 won Bronze medals. These achievement during the exhibition competition indicate that the students are able to demonstrate their ability to create an innovative product and receive recognition from the external assessors. Importantly, during the exhibition, students get the opportunities to demonstrate their products to the wider audience and get feedback for improving their product or prototype.

Reflective E-Portfolio

This project also integrates reflective e-portfolio, in which students reflected on the learning activities and showcase their product in their respective e-portfolio. At the end of semester A18, a total of 34 reflective e-portfolios were produced by each individual student. Whereas for semester A191, a total of 38 reflective e-portfolios were produced. Content analysis of the student's e-portfolio based on a rubric developed by the instructors indicate that students have deepen their learning and develop soft skills through the e-portfolio development. Soft skill elements such as creativity, digital literacy, information management, creativity and digital communication are evident in their e-portfolio.

Impact on students' learning and motivation

By facilitating students to create their own digital-based educational game, take part in an innovation competition and developing reflective e-portfolio through this DILEX project, the impact on student's learning and motivation are as follows:
Students felt that the learning strategies and approach carried out in this course based on DILEX approach are valuable, meaningful and flexible. It has also empowered students to take charge of their own learning.
Students felt that the product they created and the achievement they gain add value to their CV / e-portfolio. While the e-portfolio also prepares students for their career and future teaching practice, it fosters their 4C skills, critical thinking, creativity, communication (digital and written) and collaboration deemed important in this 21st century learning.
Students increased their motivation to learn more about digital technology and feel more confident to integrate digital-based teaching and learning in their future teaching practice.

Conclusion

DILEX project implies the importance of digital based learning activities and authentic learning experiences in developing future-proof teachers through the creation of innovative and creative educational products. This DILEX approach can be applied and transferred to other settings and has multiple levels impacts. For example, the learning approaches of DILEX has been replicated in other course SGDT 5013 (master level) and yielded similar results. The DILEX approach that focuses on student-centered learning, collaborative engagement, immersive experience and technology-enhanced learning is crucial in supporting the higher education transformation towards   IR4.0.

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DILEX implementation does not require extra resources and financial assistance. Lecturers and students can utilised the university's facilities and Internet infrastructure. Furthermore, the products created by the students can be reused by the lecturer(s) as an exemplary practice for other classes. Importantly, the products can be reused by the students themselves in their own teaching practice, such as during their practical training. The products developed by the students also have huge potential to be improved for future used, and replicated for different subject areas. The products can be improved further for research and commercialization purposes by the students in collaborations with the stakeholders (i.e., instructors or supervisors, educational practitioners and industry counterparts).

One important outcome from this project is that DILEX come with a set of rubric and instructional design planner that can be adopted by other educator or instructional designer when implementing DILEX approach.

In conclusion, the approaches employed in this DILEX is consistent with the previous literature that highlight the importance of meaningful and authentic learning experiences in higher education to help students developing appropriate skills and effective understandings of the subject area, as well as to sustain learning (Kearney, 2013; Sailin & Mahmor, 2018; Stein & Andrews, 2004).

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MODEL FOR INTEGRATED TECHNOLOGIES FOR COLLABORATIVE SERVICE LEARNING

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Highlights: The project presents a model showcasing various technologies adopted by lecturers of three (3) different courses which engage in collaborative assignment for their students in the form of service learning, being one of the high impact educational practices. The lecturers adopted Padlet as the dashboard for the project, and various Web 2.0 tools such as MS Office live document, YouTube, online images and videos. All in, the entire service learning framework revolves around integrated technologies for the accomplishment of this collaborative assignment.

Key words: Collaborative assignment, service learning, integrated technologies, Web 2.0

Introduction

Service learning (SL) is one of the high impact educational practices (HIEPS) recommended for students of higher education. SL combines meaningful service to the community with curriculum-based learning (Ku, 2020; Wall, Giles and Stanton, 2018). There are five (5) stages of SL within the context of this project (Jenkins and Sheehey, 2019):

Investigation/market survey
Preparation for the SL project
Action/carrying out the SL project
Reflections by the lecturer and the students
Demonstration/presentation

Realising the importance of planning and implementing SL appropriately, lecturers teaching three (3) different courses engaged in SL implementation by way of collaborative assignment among the students. Due to the nature of different courses: Law of Succession and Probate, Jurisprudence and Alternative Dispute Resolution, the SL implementation incorporated one learning outcome from each course. In total, the SL project by the students would achieve three (3) different learning outcomes. This innovation project presents a model showcasing various technologies adopted by the three (3) lecturers in their implementation of collaborative SL among their students.

Modelling Integrated Technologies for Collaborative Service Learning

In catering the five (5) stages of SL, and with the aura of Industrial Revolution 4.0 and Education 4.0, the following model showcases the integrated technologies for collaborative SL. The model contains the following main tools. Each of the tools are elaborated in the following sections.

Table 1: Integrated technologies for collaborative SL.

Purpose/Function	Technology name	Significance
Dashboard	Padlet	Bold
Collaborative writing/input	MS Word Online	Italic

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Multimedia share	YouTube	Standard
Multimedia storage	Google Drive	Standard
Multimedia webpage	Wordpress/Blogger	Standard

For the **dashboard**, Padlet is chosen due to its interactive nature of the application (Frison and Tino, 2019), and ease of use and usefulness of the features for the purpose of the intended SL project (Harnish, et. al, 2018).
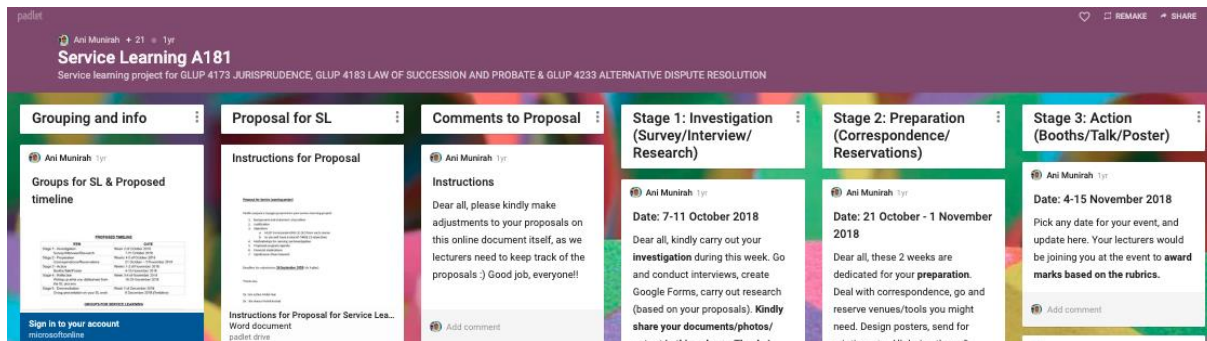
Figure 1: Padlet used as the dashboard for the SL project

For **collaborative writing or input** by the students, MS Word Online is used as it allows for real-time collaborative input by the students (Iverson and Eierman, 2018), such as choosing group members for the SL project, or determining the actual timing for the SL projects to the carried out.

For **multimedia share, storage and webpage**, Web 2.0 tools were harnessed for the purpose of implementing the SL appropriately (Mayer , 2017), such as YouTube, Google Drive and Wordpress/Blogger respectively.

Among the great features of this project are as follows:

Uses entirely freeware available online
Ease of use and useful for the purpose of collaborative assignments as SL
Interactive nature of the Web 2.0 tools which allow for great lecturers-students interaction as well as collaboration among the students.
Ease of monitoring task for the lecturers to guide the students at every stage of the SL implementation

Reflections carried out among the lecturers and students evidence the great benefits of collaborative SL, henceforth the adoption of the integrated technologies as proposed in this innovation project.
This model has high potential to be commercialised, as it serves to achieve Chapters 4 and 7 of the National Education Blueprint 2013-2025, being the "Student learning" and "System Infrastructure" aimed at enriching the learning experiences of the students with HIEPS practices, such as collaborative SL.

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When used appropriately, this model would greatly benefit the entire academia who wish to engage in collaborative assignment in the form of SL for their students. This model could become a catalyst and guide for future lecturers in their implementation of SL for their students.

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THE NACA PROJECT: ENHANCING LEARNING WITH THE MERLIN AI CHATBOT

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Highlights: Project NACA (Natural language Artificial intelligence Conversational Agents) waz undertaken to design and develop a virtual learning assistant, MERLIN, to assist students in their learning process, when they are not in class. MERLIN's role in the learning process was to act as a scaffolding agent that supported students in learning their class content online. Underpinned by Vygotsky's (1978) Zone of Proximal Development (ZPD) AI chatbot was designed with natural language processing (NLP) features to help simulate more natural conversations between chatbot and learner, and to present chatbots as scaffolds and effective teaching agents in education.

Key words: *Artificial Intelligence, chatbot, NLP, MERLIN, ZPD, Multimedia University.*

Introduction

The NACA Project was undertaken to develop and use Artificial Intelligence (AI) in the teaching and learning process. Research has shown that AI chatbots have been deficient in its use as a teaching agent, and content returned has been very limited to text-based media. Funded by Malaysia's TM Research & Development agency and carried out in Multimedia University (MMU), Malaysia, the MERLIN virtual learning assistant provided scaffolding opportunities to students while they were learning online. MERLIN was designed using Vygotsky's (1978) Zone of Proximal Development framework and, unlike typical chatbots that return content in text form, MERLIN's media assets were developed with Mayer's (2005) Theory of Multimedia Learning as its theoretical framework, utilising a variety of media, such as text, graphics, animation, videos and narration.

MERLIN, the AI chatbot

The demand for technology-based classrooms and tech-savvy educators has placed an increased level of stress on the teacher's role to evolve and present 21st century learning strategies in their classrooms (Zahiruddin Othman & Vevehkanandar Sivasubramaniam, 2019). In addition, the advent of COVID-19 in 2020, and the sudden paradigm shift toward online learning, pushed the boundaries of education even further, necessitating the transformation of the delivery of content to be at par with Gen Z learners' demand for convenient and immediate access to content and information. This is even more evident with research showing that learning online results in a lack of learning support from the teacher to the students, and this is consistent with Armstrong (2019) who posits that scaffolding is critical to a student's learning process.

The MERLIN chatbot is an artificial intelligent conversational agent that can be accessed by students online 24/7, anytime and anywhere they feel comfortable. The chatbot is infused with

natural language processing features to simulate intelligent human language interaction through text and other media, and to address the issue of the lack of use of chatbots as educational tools. In this project the MERLIN chatbot was developed and mapped to the class content of learning lighting in 3D modeling, a topic that students in a Diploma degree course have found daunting and hard to understand. The chatbot prompts students to type questions relating to the topic and returns content in the form of text, graphic and videos. Figure 1 shows an example of this.

Figure 1. The MERLIN chatbot returns answers in media-rich forms
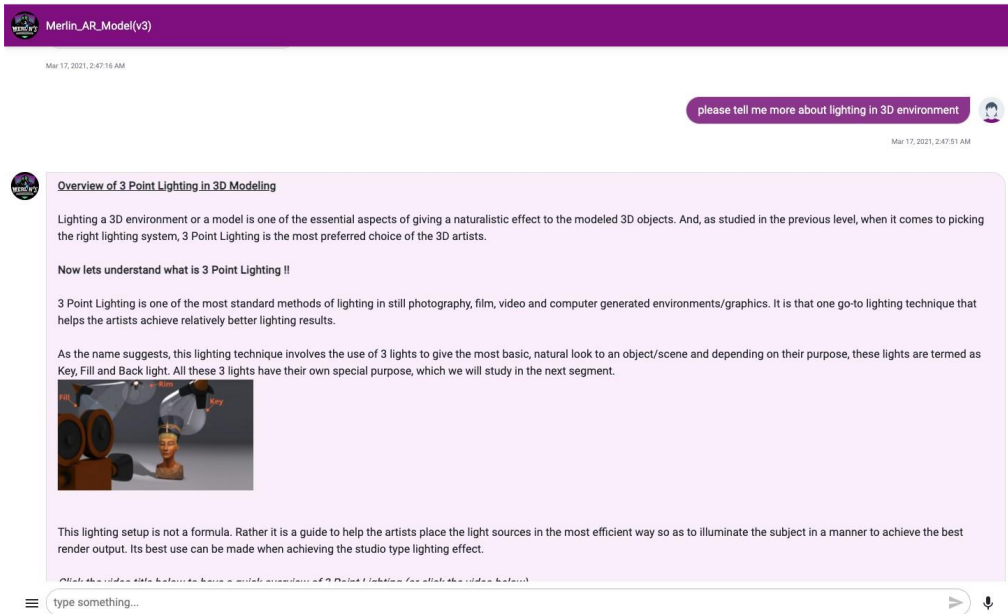
In addition to the text and image based content, MERLIN also provides audio narrations of some of its content, especially where the textual descriptions could become lengthy. An accompanying narration is embedded to further explain the information is a clear and succinct way, very much how a teacher would explain content in a classroom setting (see Figure 2).

Figure 2. MERLIN's content is also accompanied by audio narrarions

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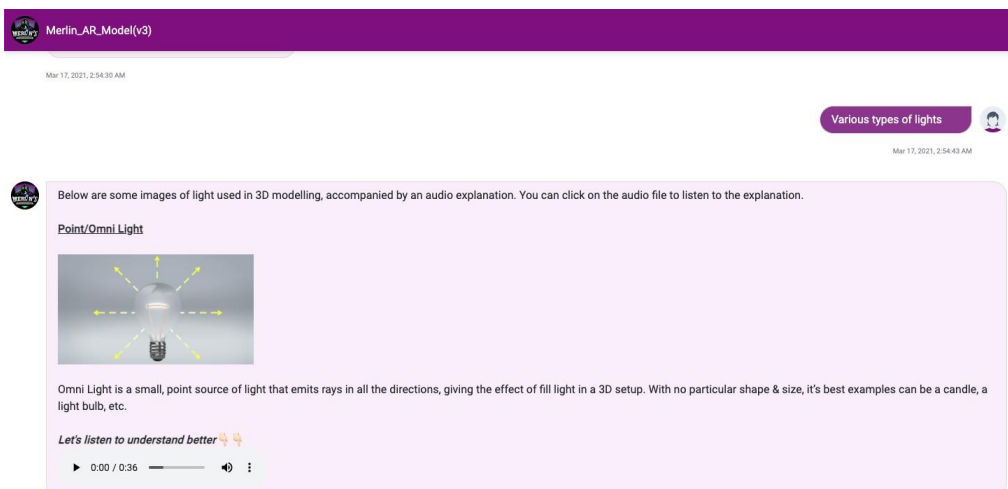
Impact:I

The impact of having MERLIN to learn with is 1) the chatbot is accessible 24/7 and picks up the topic that is discussed in class; 2) the incorporation of Natural Language Processing (NLP) features allows for a more natural and conversational-like interaction between the learner and the chatbot, increasing the likelihood of attention and retention of the material; 3) Students are supported and scaffold in that content is provided for them in anticipation of web and Google searches, resulting in a more concentrated effort for them to learn the content; 4) Online learning is then made more motivating and fun, and student will feel more secure in knowing that they have teacher support in their learning process, even when the teacher is not around.

A survey was administered to gauge students' perceptions of interacting with an AI chatbot in their learning. Results showed positive feedback and strong encouragement for the development and use of AI chatbots as scaffolding agents in learning environments.

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SOCIAL WORKED-EXAMPLE TECHNIQUE: AN ENGAGED PROGRAM VISUALIZATION TOOL FOR NOVICE

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Highlights: A Social Worked-Example Technique (SWET); is a web-based programming visualization tool developed to help novice students to learn how-to programming. A program visualization tool allows students to visualize the run time behavior of a given code. It designed to help students to understand difficult programming concepts. Besides, the SWET tool adopts many features that aim to enhance student engagement with the tool. Active learning and student engagement are important factors of success for any educational tool. Two controlled experiments (n=26, n=77) were conducted, the results show increasing on student time-spent-on-tool (behavioural engagement) by 34%, and 45%, respectively.

Key words: Programming; Student engagement; Programming visualization

Introduction

It has long been viewed that programming is a challenging and difficult topic for novice student. Therefore, program visualization (PV) is recognized as a promising solution to enhance programming education for students. PV refers to "graphical representations to improve human understanding of the actual implementation of programs" (Rößling & Velázquez-Iturbide, 2009). Therefore, there are still some critical issues regarding using these tools, which include: low adoption rate, short-lived research prototype, and high concern about their effectiveness and their impact on the learning outcome (Fouh et al., 2014).

In addition, it has been shown that existing PV has failed to engage students effectively. However, student engagement plays an important role in the learning process (Ericson et al., 2015). Despite the importance of student engagement in the successful design of PV tools, the focus on how to improve engagement when constructing PV tools is very limited on the domain.

Content

What is SWET?
SWET tool designed on the principles that keep students engaged using the tool has a significant impact on the learning outcomes. The role of student engagement considers as a moderating variable for learning outcomes. During the design phase, the engagement is considered as a multidimensional construct (includes emotional, cognitive, and behavioral engagement), which can provide depth insight into the engagement compared with the old way to defined engagement as a basic construct.

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SWET Design

PV research suffered from a lack of adopting of theoretical foundation (Cetin, 2020). The first step was to define theoretical framework; which will help to build effective solution. Four theories were identified which are: Constructivism, Social constructivism, Cognitive Load Theory, and Gamification.

From the aforementioned theoretical framework, engagement design feature taxonomy was built that consists of 4 categories. This taxonomy will help to identify the engagement feature and provide a theoretical foundation for those features. Finally, 13 features were identified, then mapped into the emerged taxonomy, See Table 1.

Table 1: Category of Engagement Design Feature.

#	a. Interactive	#	b. Collaborative
1	Control flow	1	Pari programming
2	Tracking Progress	2	Text-based Chat
3	Immediate feedback		
4	Interactive activities		
5	Customizable dataset		
#	c. Cognitive	#	d. Gamification
1	Worked example	1	Leaderboard
2	Parsons problem	2	Badges
3	Conflictive animation	3	Points

System design and implementation

The tool was developed in the form of a web-based system that is accessible by the students whether inside or outside of the classroom. Figure 1 displays the user interface for SWET tool. The system is designed based on the theoretical framework, where it implemented four components:

Control flow refers to enables students to control the execution of a program by moving a step backward or forward, to the beginning, or the end. It enables students to manually navigate the change that occurs during the code execution, like data flow, variables change, etc. By allowing a student to navigate forward and backward through an activity or program execution this feature could engage students.

Worked example refers to presents a step-by-step solution to a problem. For a novice student, using worked example will reduce the cognitive load on them to learn new concepts. In SWET tool, nine examples on topics of array and loop given to allow students to practice the topic.

Text-based chat refers to allow the student to interact with another peer, or a teacher in real-time while using the tool. Introducing a text-based chat in PV, open many opportunities for student and teacher to effectively collaborate with each other. In the SWET, we introduce this feature in form of question and answers, where students are allowed to ask questions on a specific line of the code and seek help from their peers or teacher.

Leaderboard refers to a board that tracks and displays the current performance of each player (student) to all other players. It is used in education to allow students to directly compare their own accomplishments related to other students in the same class.

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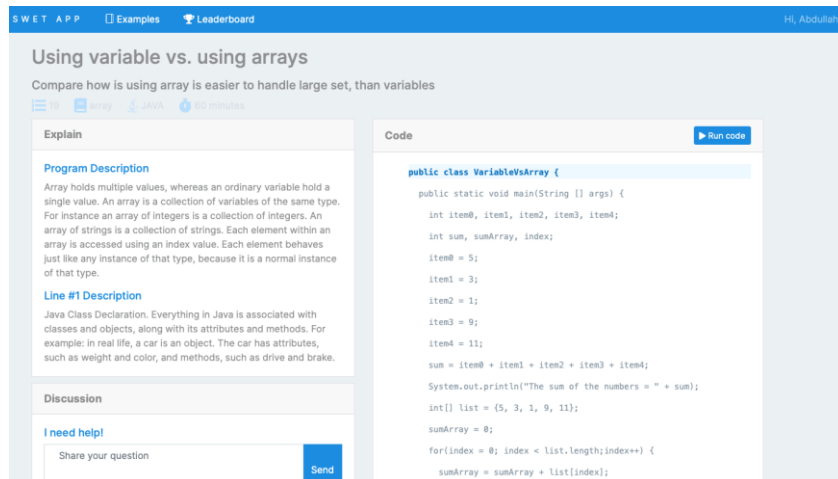
Figure 1 Main screen for SWET app

Besides the traditional visualization mechanism, four extra features were implemented, to boost students' experience. A result, students will spend more time using the tool. The more time student spent and interact with the tool and other stakeholders on the system; the more students gain. Previous tools were focusing only on behavioral engagement, which leads to less impact on student engagement. In SWET the selected features ensured to be had an impact on the three dimensions of the engagement.

Conclusion

The proposed SWET tool is focusing on giving a novice programming student a comprehensive tool; the focus on enhancing learning outcomes and student engagement with the technological tool. Both outcomes support each to achieve the educational goals. The tool is developed based on a solid theoretical foundation; that makes it capable to help novice programming students. As the tool built to focus on novice students; make it support college or school level students. SWET had been evaluated on first years' students at UUM. The results from both experiments were promising. More researches recommended to further study the tool on different student levels and different programming languages.

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MASSIVE OPEN ONLINE COURSE (MOOC) ON OCEAN REMOTE SENSING TOWARD CLIMATE RESILIENCE

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Highlights: A virtual capacity building development (CBD) program on the Universiti Teknologi Malaysia (UTM) Massive Open Online Course (MOOC) Open Learning platform had successfully developed involving 13 modules presented on the pre-recorded videos; plus, a student-mentorship program to foster active interactions between our experts and participants. This particular CBD is the first of its kind supporting the university initiatives to foster the Learning On-Demand and flexible education. The CBD theme focused on the 'Ocean Remote Sensing towards Climate Resilience', for curating early-career scientists and students to benefit from interactions and mentored, by the experts participating from all over the globe. Such fostering of relationships will help young scientists develop scientific ideas, research projects and papers.

Keywords: Remote Sensing; Oceans and Coastal; MOOC; Flexible Education; Learning on Demand

Introduction

To support development in the maritime climate preparedness, one needs technology capable of monitoring the oceans, marginal seas, and coastal areas thoroughly and systematically. Remote sensing (RS) from space is unmatched in terms of spatiotemporal coverage. Remote Sensing technology, along with in situ measurements, is essential for monitoring marine natural resources & for assessing climate and human impacts in coastal areas, e.g., monitoring sea levels, coral reefs, and marine utilization planning for various sectors of the economy such as tourism for example. It is also crucial for monitoring and studying climate variability and change, biodiversity

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and ecosystems, and changes in the atmospheric, marine, and coastal domains and their societal impact.

A virtual capacity building development (CBD) program on the Universiti Teknologi Malaysia (UTM) Massive Open Online Course (MOOC) Open Learning platform had successfully developed involving 13 modules presented on the pre-recorded videos; plus, a student-mentorship program to foster active interactions between our experts and participants. This particular CBD is the first of its kind supporting the university initiatives to foster the Learning On-Demand and flexible education. The CBD theme focused on the 'Ocean Remote Sensing towards Climate Resilience', for curating early-career scientists and students to benefit from interactions and mentored, by the experts participating from all over the globe. Such fostering of relationships will help young scientists develop scientific ideas, research projects and papers.

The flexible learning was supported in various capacities by the Tropical Resource Mapping Research Group of UTM, Pan Ocean Remote Sensing (PORSEC) Association, Centre of Excellence of Geoscience and Digital Earth Centre (INSTEG, UTM), UTM MOOC, Asia Pacific Network (APN) for Global Change, and Committee of Space Science Research (COSPAR).

The physical CBD tutorials have been a feature of past PORSECs since 2000 and have been found to provide valuable interaction between senior professionals and researchers, early career scientists and professionals, and students. Due to pandemic COVID-19, the physical CBD was transformed to a digital and flexible learning. A total of 26 students from 8 countries of the Asia enrolled to the virtual course. Participants were among the research students towards their Master/PhD, and researcher/postdoctoral from the national/governmental institutions. Whereas, honored instructors were from 8 countries across the continents.

Apart from the learning process via the pre-recorded videos, the student-mentorship relationships between senior scientists and young scientists and students were encouraged. These relationships help new scientists develop scientific ideas, research projects and papers, which becoming one of our remarkable outcomes. It gives students and early-career scientists detailed practical examples of remote sensing techniques used for monitoring the ocean-atmosphere system for research and operations, and the ability to develop networks with other students and senior scientists.

Content

The Capacity Building Development (CBD) on Ocean Remote Sensing towards Climate Resilience was innovated to work on the Open Learning Massive Open Online Course (MOOC) Platform. The MOOC course consists of 13 modules that were prepared by 13 international instructors worldwide. Each module contained pre-recorded videos, and assessments to measure the student understanding. In addition to the 13 modules, the student-mentorship program had added values to the course, where instructors became mentors to group of students and assist in developing scientific ideas, research projects and papers.

Certificate of completion was awarded to participants who completed the following: 1) 100% progress; 2) more than 80% of assessment marks; and 3) status of project submission (from student-mentorship program).

Effective policies for sustenance of coastal countries can be devised from informed decisions, for which, robust monitoring of oceans is a must. The persistent advancement of satellite remote sensing technology offers an array of parameters through which behavior of oceans can be monitored and predicted. Undoubtedly, ocean remote sensing (ORS) has not only saved millions of lives and assets in past few decades, the technology has led to the prosperity

manifold. It is thus imperative that the ORS will continue to guide the way for better management of our resources and environment in the future. However, the best outcomes of the technology can only be achieved through the continuous exchange of the know-how across the globe, especially to the rising generation.

The physical CBD tutorials have been a feature of past PORSECs since 2000 and have been found to provide valuable interaction between senior professionals and researchers, early career scientists and professionals, and students. Due to pandemic COVID-19, the physical CBD was transformed to a digital and flexible learning.

The course was designed with two important components: 1) teaching and learning materials through pre-recorded videos and assessments; and 2) student-mentorship program. The instructors are among the leading scientists and professors from reputable governmental agencies and universities from Malaysia, United States, United Kingdom, France, Italy, Taiwan and Spain.

Why are they important to education?

The CDB course offers flexible learning and learning-on-demand. Remote sensing techniques are very useful tools in the study of sustainability research, widely used in support to science-based decision-making. During CDB, participants have an opportunity to learn new technical and scientific approaches that have been used not only in the Asia-Pacific region but elsewhere, and that can be used alongside modeling and other sources of in situ data towards decision making.

Developing capacity and providing participants with an opportunity to better understand issues that are impacting the marine environment through application of remote sensing technology to further understanding of Earth's environmental processes such as climate variability, oceanic hazards (e.g., sea rise; pollution effects).
offering flexible learning and learning-on-demand

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

Commercial value: yes

Course Fee: RM 320/pax

Acknowledgement

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PORSEC publishes a Bulletin 3 times per year, with news and articles on the association's activities. All can be accessed via https://porsec.nwra.com/bulletins. The following Bulletins have final reports of previous CB courses:

Bulletin of the PORSEC Association Volume 1.1 (2007), Volume 3.1(2009), Volume 4.3 (2010), Volume 6.3 (2012), Volume 8.3 (2014), Volume 10.3 (2016), Volume 12.3 (2018)

Selected other PORSEC publications are listed on the PORSEC website: https://porsec.nwra.com/publications/

The Capacity building program is also described in:

Katsaros, K. B., G. Levy, A. Bentamy, S. King, J. F. R. Gower, and C. Wilson: TUTORIAL ON REMOTE SENSING FOR CAPACITY BUILDING, Outreach and Broader Impacts session, 26th Symposium on Education, Proceedings of The 97th AMS Annual Meeting, Seattle, WA, January 22–26, 2017. American Meteorological Society (available on: https://ams.confex.com/ams/97Annual/webprogram/Paper313965.html).

Kumar, Nimit, Kristina B. Katsaros, Gad Levy, Stephanie King, and Cara Wilson, 2018: PORSEC Activities - An Overview: Remote Sensing Tutorials For Capacity Building Across The Globe. Programme Guide (p.16) and Book of Abstracts & Lead Articles (p. 159), The Second International Symposium Remote Sensing for Ecosystem Analysis and Fisheries. Societal Applications in Fisheries and Aquaculture using Remote Sensing Imagery. January 15 to 17 Kochi, India. ISBN: 978-93-82263-19-7

WHAT MOTIVATES USE OF ABSTRACT ALGEBRA MOBILE E-BOOK?

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Highlights: This study investigates the use of Abstract Algebra mobile e-book by university mathematics students. The Abstract Algebra mobile e-book could be accessed via all types of hand-held mobile devices. It is available in PDF format. It has many built-in-features such as highlight, underline, search, bookmark, annotate and learning mode changer. A study to understand the factors that motivates the use of Abstract Algebra mobile e-book shows utilitarian, cognitive affective, social norm and content quality motivates its use among university mathematics students.

Key words: *utilitarian; cognitive; affective; interview; qualitative; algebra*

Introduction

Industry Revolution 4.0 (IR 4.0) demands the higher learning institutions around the world to integrate technology meaningfully in their academic context. Mobile e-book is one of the technologies that is expected to fulfill the need of the current digital learners. Mobile e-book is the e-book which is accessed and read via hand-held mobile devices such as tablets and smartphones. Lai and Ulhas (2012) Parsons (2014) and Weisberg (2011) reported that higher learning institution students from the field of business and management, engineering and medicine prefer to use e-book. However, mathematics graduates responded negatively to the use of e-books (Letchumanan & Tarmizi, 2011; Littman & Connaway, 2004). Those mathematics graduates who read e-books mostly read e-books via e-readers, computers and laptops instead of handheld mobile devices (Pinto, Pouliot & Cordón-García, 2014). This shows that mathematics mobile e-books are underutilised although the facilities are readily available. Furthermore, past studies showed that many studies have investigated university students' experience of reading academic e-books via e-readers, computers and laptops (Anuradha & Usha, 2006; Lai & Chang, 2011). Nonetheless, there is a limited research on the students' experience of reading mobile e-books. Therefore, this study aims to understand the factors that motivate use of mobile e-books among mathematics postgraduate students in Malaysia.

This study employed qualitative case study approach. Eight mathematics postgraduate students from a local public university in Klang Valley, Malaysia participated in this study. These participants mostly were using mobile e-book that were freely provided by the university library. The participants mainly referred to mobile e-book entitled Abstract Algebra and other mobile e-books that related to algebra. The Abstract Algebra mobile e-book used by the participants is offered in PDF version. It has many built-in features such as bookmark, search, highlight, and underline and annotate. The mobile e-book has 657 pages with 27 chapters. It has a very simple design with white background and black text. The content consists of text, formulas, diagrams, graphs, and tables. It has a table of contents on the front part of the book and index at the back. This mobile e-book gave detail description of the abstract algebra fundamental concepts and supported with extensive exercises at the end of each chapter. The exercises basically test the students' analytical skills, problem solving skills and computational skills.

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Data of this study were collected via semi-structured face-to-face interview and non-participant observation. Collected data were analysed in terms of constant comparative method in NVivo 11 software. The findings show that there were five categories of the factors, namely utilitarian, cognitive, affective, social norm and content quality motivates the use of mobile e-book among the participants. Utilitarian factors include reasons such as convenient, ease of use and low-priced. Meanwhile, cognitive factors explain the positive learning outcomes produced using mobile e-book. In addition to that, affective factors refer to the attractive, fun and pleasure learning environment produced when using the mobile e-book. Meanwhile, social norm factor justifies that recommendation from the trusted parties such as lecturers and peers may also encourage the use of mobile e-book. Finally, content quality factor such as precise, clear and understandable mobile e-book content also influence its use.

When the Covid-19 pandemic swept across the world in 2020, schools and higher learning institutions were closed, and education was moved to students' homes. Thus, digital technology such as mobile e-book enables the students to have access to sufficient learning resources at all the time. Use of mobile e-book enables the students to collaborate and exchange their learning resources that can result in positive cognitive outcome. The study also shows that use of mobile e-book provides exciting and pleasure learning environment. Thus, investigating the factors that encourage use of mobile e-book enables the university management to understand the reasons that motivate the use of mobile e-book and implement the policy of using mobile e-book as one of option at the university level. Finally, this study can provide the commercial value to the higher learning institutions to use mobile e-book technologies widely as it clarifies to the university management the advantages of using mobile e-book in the selected academic context and ability of the mobile e-book to offer learning content at anytime from anywhere.

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MYCIKGU SYSTEM APPLICATION (A Preschool Recording System)

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Highlights: This project is MyCikgu System Application. It is to develop a new preschool recording system to replace the old system which include the National Preschool Assessment Instrument (Instrumen Pentaksiran Prasekolah Kebangsaan). The old recording system which currently in used is through Microsoft Excel. MyCikgu system also helps to record and document the result and information of the preschool student. The system will also give benefits for parents so they can view their children's result and assessment.

Key words: *web-based system, preschool, online, teachers, instruments, parents.*

Introduction

Preschool Education is a program that provides learning experiences for children aged 4 to 6 years for a period of one year or more before entering Year One in primary school. The aim is to develop the potential of children comprehensively and integrated in physical, emotional, spiritual, intellectual, and social aspects through a safe, nurturing learning environment as well as fun, creative and meaningful activities. This is to improve skills, instill confidence and form a positive self-concept in children so that they succeed in the existing environment and are ready to address the challenges and responsibilities in primary school. Assessment is important in ensuring effectiveness curriculum implementation in schools using a variety of approaches and methods which is assessment for learning, assessment as learning and assessment of learning.

As a preschool teacher, the track record is very important as evidence of doing assessment. They need to identify the number of learning standards (LS) to be taught and identify the achievement of student skills. It will be a data support for the issues in strategic planning and construct and plan interventions based on record analysis. The importance of the data already recorded is that it can be shared for use during the year for teacher reference and they can plan schoolwork and enrichment training more focused. So, it is very important for teachers to record data accurately and perfectly.

Data recording is the process of recording the development of student learning after the teacher perform assessment in teaching and learning (T&L). The level of learning is determined after the teacher performs the T&L and the teacher records the level of learning using a recording template according to the subject by using the Microsoft (MS) Excel software provided. There has shown difficulty for teachers to fill in student achievement assessment information in excel because it is important to mark each learning standard and skills that students do manually.

Two major issues can obstruct early childhood educators' ability to use data to make informed decisions. The first is a limited number of studies on the best ways to use data in early childhood education. The second issue is a lack of capacity among preschool programs to collect data and use the information to make decisions. The research fills in the gaps in the understanding on the types of data that administrators and teachers obtained on early learning outcomes, dosage (the

amount of time children spends in early childhood education programs), and classroom quality; how data is used; and the difficulties they encountered in gathering and using data.

MyCikgu is a web-based system application for Prasekolah teachers to fill the online recording result and information for preschool students according to the subjects and instruments learned. The system will make it easier for preschool teachers to record and identify their student achievement without need to fill the data manually. Basic information such as student name, school, class, teacher name and students according to the classes taught in the reporting template by subject will be automatically updated in the system. Teachers will record the level of learning mastered by students according to content standards and learning standards that are already provided more easily and not manually. They only need to choose which level of student learning is at and the information will be updated in the system and in the database automatically. This study is based on problem arise around Johor.

Content

MyCikgu System Application

It is a web-based system for government preschool teachers to fill the online recording result and information for preschool students according to the subjects and instruments learned. It is also for teachers to fill the National Preschool Assessment Instrument (Instrumen Pentaksiran Prasekolah Kebangsaan) and the main reason is to renew the recording system currently in use which is through a Microsoft Excel template. The system also has function for parents to discover and observe their children and understanding better in terms of knowledge.

Background of the system

Based on the above, this project proposes a method and develop new online recording system, MyCikgu System Application. The system would make it easier for preschool teachers to monitor and classify their students' progress without having to manually fill out forms. The system will automatically update basic information such as student name, school, class, teacher name, and students according to the classes taught in the reporting template by subject. Teachers can record the level of learning mastered by students based on content and learning requirements that are already presented in a more automated and less time-consuming manner. They just need to choose the student's learning level, and the details will be automatically updated in the system and database. This research is focused on a problem that has arisen in Johor.

The study aims to investigate and solve problems of filling in the report assessment data of Preschool students among preschool teachers in Johor. The study includes the use of any handheld device for the system to be built which is a mobile-friendly system application for MyCikgu. To accomplish the aim for the system, a few scopes have been outlined.

User Scope

The user involved in this system are:

Teacher: Preschool teacher who need to fill students' assessment report.

Parents: The caregiver of the Preschool student who want to receive their kid's report.

Admin: Employees that need to collect the teacher's report update.

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Function Scope

The main function is to facilitate the process of giving and receiving reports of Preschool students. The system will be in Bahasa Malaysia like the current existing template which is the Ms Excel. The study includes the use of Visual Studio Code and the application will be web-based and mobile friendly system. The platform for database is MySQL database. The detailed functions are based on the user scope, as follows:

Teacher
Edit and update students' data.
View students' lists and full report.
Send notifications through Email or SMS (WhatsApp).
Print out whole result.

Parents
View their kids result for each component.
Receive notifications of Student's report.
Print out the result.

Admin
Check percentage of update status.
View list of teachers o send reminder or notification.
Add new teacher view teacher's list.

Development Tools

MyCikgu System Application developed in Visual Studio Code. VS Code is a simplified code editor with support for operations such as debugging, task running, and version control creation. This involved the use of PHP. PHP is a recursive acronym for "PHP: Hypertext Pre-processor." PHP is a scripting language on the server side that is embedded in HTML. Dynamic content, databases, session tracking, and even the creation of entire e-commerce sites are managed. Next, the use of MySQL, it is a relational database management system based on SQL which is a Structured Query Language. The programme is used for a wide variety of purposes, including applications for data warehousing, e-commerce, and logging. The most common use of MySQL is for the purposes of a web database. Plus, the localhost for the system development is XAMPP. XAMPP is a free and opensource cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.

Importance of the system

The method of observing children's actions or behavior over time is known as observation in early childhood education. Educators may see trends and prepare age-appropriate activities, gain insight into how a child thinks about the world and provide resources for educators to improve the environment and foster growth and development through meaningful and thorough documentation. When a teacher takes a step back and studies a child in their care, they will gain

a deeper understanding of the child's strengths and weaknesses. Educators' programming can help change the environment and promote learning by using observations. Teachers want to encourage growth and development of skills in all areas to help the child grow. Bringing this knowledge back to parents and communicating with them individually to ensure that the child is encouraged both at home and in the classroom is the importance of the observation.

Advantages of the system

To strengthen the proposed method, the results from the analysis will be used. There are two existing system, MS Excel template and Oregon Statewide Assessment System that have been considered. Table 1 indicates the contrast between the current system and the proposed system.

Table 1: Comparison of the existing system

Features	Microsoft Excel template (current system)	Oregon Statewide Assessment System	MyCikgu (new system)
Create Account and Log In	X	/	/
Edit and Update Profile	/	/	/
Student Data and Information are Organized	X	X	/
Time Saving	X	/	/
Clean System Application	X	X	/
Standardization of Data	X	/	/
Automated System Application	X	/	/
Receive Notification or Reminder	X	X	/
Easy-to Read Report	X	X	/
Available in Bahasa Malaysia	/	X	/

The findings of the study will reduce the problem of waste of time for preschool teachers. Most of them are elderly and possibly married. Time constraints are the main cause that teachers face while filling in student performance data. They need something that can help them save time so that they can do other work besides just having to face this data filling process.

So, this MyCikgu application can help them reduce the time wasted in the process of filling out student performance data and they do not have to face data refilling problems. They no longer must deal with data problems that are not as requested by their superiors. So, this application will standardize all the data that needs to be filled. No more corrupt data problems and it will be easy to fill.

Lastly, these findings will study the effectiveness of using online applications. The data they have filled will be automatically updated in the school data system. They can correct some data without having to refill all the data. The filling process will be easier with step by step without the need for special classes to learn even the learning process is not so complicated.

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By having this project, it will bring significant impact to the user, which is to the Teacher, Admin and Parents. Besides, it will improve the school reporting process and ensure the efficiency in the assessment reporting.

Commercial Value

The revenue streams are through subscription services which will keep a percentage on the financing obtained by the used of system application. Possibility on selling the system application especially to Kementerian Pelajaran Malaysia or sell it to any school who interested. This will rely on the profits coming from the sellable applications.

In terms of marketing, video marketing is the most engaging form of digital marketing because it can capture a user's attention in the shortest amount of time. Create interesting and witty animated videos to attract users to use this system. Simple informational explainer videos that focus on the features rather than obvious exaggeration are also efficient. It is important to have a presence on at least LinkedIn, Facebook, and Instagram. Since most teachers are on Facebook, the framework is well suited for promotion through the social media platform. Other than that, by simply use the PPC (Pay Per Click) ads or Google ads on Search engine will totally boost the system and help to increase the sales.

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DEVELOPING MALAYSIAN-BASED FINANCIAL LITERACY CYBERGOGY MODEL TO PROMOTE HUMAN VALUES AND PRACTICES AMONG SECONDARY SCHOOL STUDENTS

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Highlights: This study main objective was to develop a new Malaysian-Based financial literacy model that integrated instructional, ICT that engage learning online known as cybergogy. A mobile web named Finlite that consisted of economics notes, videos that integrated financial literacy and human values with Malaysian-based real world learning experience, quiz, financial literacy quiz, financial calculator and feedback was an innovative product of this study. A unique financial calculator was specially designed for secondary school students. The videos also tailored to secondary school students which incorporated Form 4 economics curriculum and financial literacy.

Introduction

Malaysians consider themselves good in financial literacy, however they are unaware that they are financially illiterate (Murugiah, 2016; Mohd. Samsuri, Iiyani & Siti Aishah, 2017). Moreover, financial literacy is seldom discussed among the young generation (Mohd Samsuri, et al., 2017). The young generation has not realised the importance of financial literacy (Yahaya, Zainol, Abidin, & Ismail, 2019), and most of them are materialistic. Their spending behaviour has been influenced by materialistic media messages from the internet (Abdul Adzis, Abu Bakar, & Kadir @ Shahar, 2017). In other words, the young generation lack human values, and the electronic media easily influence them.

School teachers always complain about the burden of their workload. Most of them are examination-oriented because school students need to sit for the public examination, *Sijil Peperiksaan Malaysia* or the Malaysian Certificate of Education (Ministry of Education, 2013). As a result, most teachers are busy preparing the students for the examination by doing all types of exercises rather than instilling any moral values. Even though the students study the value of moderation, making decisions and problem-solving beginning 2017 (Vishalache, 2016, June 19), but financial literacy is only a small segment of the value of moderation taught. Teachers teach the values and monitor the students' conduct through their daily school behaviours, but not how much money they spend. However, how can the teachers have extra time to monitor students' behaviour, especially in spending and saving behaviours? The best way is to cultivate the students' self-control of their own expenditure.

 Moreover, the scope of human values such as accountability, decision making, and ability to overcome obstacles is wider than moral values, and the teachers do not have time to instil these

values in the lesson. Financial literacy is growing importance in development and developing countries (Mohd Abdullah & Nur Atiqah, 2018; Abdul Halim & Curugan, 2016). Therefore, instilling the basic knowledge of financial literacy is workable. Since students are attracted closely to new technology, the learning new possibilities are easy to create with the advancement of ICT (Anelka Aziz, 2018). An integration of technology into the teaching of financial literacy can promote students' learning interest which is in line with Malaysia Education Blueprint 2013 2023 (Ministry of Education Malaysia, 2013) and Education 4.0. On the other hand, online learning has an emerging trend to provide increased interaction and engagement in secondary school education. Most importantly, a proper cybergogy model can be designed for the school students who are financially illiterate in Malaysia. This study aims to develop a financial literacy cybergogy model to promote human values, practices, and accountability among secondary school students.

Content

Finlite development

This study consisted of two phases. The first phase included the development of the model, questionnaire, learning activities, Finlite and fieldwork in testing the functionality of the Finlite. The model was developed based on Theory Planned Behaviour (Ajen, 1991) and Mayer Multimedia Theory (Mayer, 1984) the second phase examined the effectiveness of Finlite. This phrase also will examine the effect Finlite to promote financial literacy among students.

Phase 1
This stage involved the development of the model, questionnaire, learning activities and Finlite. The development of Finlite frameworks built to save time, reduce cost and be more computable. The quality of the mobile application becomes the major concern of this phase. Experts in the related field provided comments and supervise the progress of the development of the Finlite from time to time.

The prior fieldwork for testing the mobile application's functionality, pilot testing was run among 30 students before employing the actual fieldwork. Before the fieldwork, the speed of the internet connection of the school needs to be checked. A total of 50 students in one secondary school of Form 4 students in Perak were employed as samples in this stage. Samples will be selected by using the purposive sampling method. The content of the Finlite was verified by the Malaysian Financial Planning Council and one school expert teacher; whereas, this apps conducted the heuristic evaluation.

Phase 2
The questionnaire has been administered to 327 secondary school students after they used Finlite for eight weeks. The Structural Equation Modelling Method has been selected to validate the model. A follow-up interview with eight students conducted in this stage.

Context of Innovation

Simple, user-friendly with the elements of videos that integrated economics curriculum and financial literacy are innovation contexts. It also has a financial calculator that is specially designed for secondary school students.

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Cybergogy learning model, a new learning theory, Finlite mobile web and a set of questionnaire becomes the novelty of this study. This study also benefits people to become self-sufficient and achieve financial stability.

Finlite is important to Education in term of:

The content of this Finlite in line with the current secondary school economics syllabus and examination.
Can use as teaching aids, group learning activities, self directed learning tools because every story comes with assessment questions.
It suits to current online learning trend or face-to-face learning context.
Exposes students to a cybergogy learning model.
Exposes students to Finlite mobile web that have financial calculator that specially design for students.
Instil students to have values needed in financial literacy
Provide an effective learning experience to students using videos that incorporated financial literacy into the curriculum.

Advantage of Community and society

To promote financial awareness among users.
To cultivate Malaysian citizens with values and good practices of financial literacy.
To build sense of accountability.
Environmental friendliness with 3R concept (**reduce-reuse-recycle).**

Commercial value

This app has registered in Commercialisation unit, UPSI
The secondary product- Book "Kaedah Pembelajaran Abad ke 21" has launched on Dec, 2021
To promote and market this learning method to other educational institutions
Copyright

Acknowledgement

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M-LEARNING: USING TELEGRAM TO ENGAGE AND GAMIFY ESP LEARNING

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Highlights: The advent of smartphone is surging through all spheres of life, especially among the young adults. The use of smartphone is no doubt revolutionising the field of education as well. Knowing the fact that social messaging application has become part and parcel of the young adults' life, integrating Telegram into ESP learning is of great importance. Incorporate the use of Telegram in ESP learning is said to be a valuable extension of traditional ESP learning methods and also to leverage the advantages in ESP learning.

Key words: M-Learning, Telegram, ESP learning, Mobile learning, blended learning

Introduction

In this digital era, the educational needs of the growing populations can hardly be met in a traditional classroom environment. Therefore, we are moving forward from a traditional way of teaching and learning to a new and improved media to serve special needs of the learners. Mobile learning is not something new in Malaysia. Mobile learning a.k.a m-Learning according to Parsons & Ryu (2006), can be defined as the delivery of learning content to learners utilising mobile computing devices. Quinn (2000) defines m-learning as an extension of e-learning happening through mobile devices. On top of that, m-Learning in education is even more flexible than previous e- Learning applications (Georgiev, Georgieva, & Trajkovski, 2006). Such method has now evolved from using desktop to laptop, tablets and currently smartphones. Recognition of the rapid proliferation of smartphones and the emergence of countless number of social messaging mobile applications today, we realise the needs of combining the use of mobile applications in English for Specific Purposes (ESP) learning. This is especially essential among the young adults in which smartphones and social messaging applications have become part and parcel in their daily life. Among all the social messaging applications, Telegram has been chosen as a platform to engage and gamify ESP learning among the young adults.

As a cloud-based app, Telegram users can exchange videos, pictures, audio or any file stored without taking any space in their mobile devices (Ghobadi & Taki, 2018; Abbasi & Behjat, 2016; Serostanova, 2014) with a focus on security and speed at the same time. Apart from the aforementioned advantages, Telegram channel can accommodate unlimited number of members. Telegram also supports multi-platform, such as Androids, ios, windows phone, windows pc, Mac

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os, Linux os and any browser. These significant features have made Telegram a useful platform for ESP learning.

Apat from that, ample of empirical studies have shed light on the use of Telegram in particular, is effective in teaching and learning English language (Heidari-shahreza & Khodarahmi, 2018; Xodabande, 2017), and also in acquiring and improving English language skills, including reading comprehension ability (Naderi & Akrami, 2018), vocabulary (Ghobadi & Taki, 2018), writing skill (Aghajani & Adloo, 2018), speaking skill (Setiawan & Wahyuni 2017; Xodabande, 2017) and also pronunciation (Xoddabande, 2017).

The Telegram channel (English for Biz Comm) created is aimed at helping the ESP learners to enhance and improve their ESP skills through a set of engaging activities and games which can eventually motivate and encourage the ESP learners in their learning. While the Telegram Chatroom (Super Biz Chatroom) enables these ESP learners to pose their questions and comments. Such function in the chatroom helps the shy and introvert learners who often avoid to participate in face-to-face learning to express themselves and share their ideas and thoughts with others in a less stressful atmosphere (McQuiggan, Kosturko, McQuiggan, & Sabourin, 2015). Cooperative learning can be seen at this stage. The ESP instructors (the administratives) can also have more interactivity with the learners and this can help to develop an active learning environment (Hutchison, Beschorner, & Schmidt-Crawford, 2012).

Basically, the use of Telegram app in ESP learning can help the ESP learners to expand and encourage their ESP knowledge and also experience. The ESP learners can engage in a fun and interactive activities by joining the Telegram Channel and Telegram Chatroom. Besides that, it helps them to learn by examples and achieve better understanding of the subject content. All these can help to produce world-sensing generations who are future competent.

The innovation of this project is at its best in enhancing and developing a unique, interactive and creative way of ESP teaching and learning. The Gold Medal won (Creative & Innovative Carnival 2019) have further proven that this breakthrough is no doubt a trustworthy and quality guaranteed product. Moreover, the publication of this project is supported by Faculty for Languages Studies and Generic Development (FBI), Universiti Malaysia Kelantan. After the pilot testing and competition, this project has been fine-tuned for the benefits of ESP teaching and learning. Most importantly, this project is also designed based on the needs analysis of the ESP learners. The results gained from the needs analysis have indicated that a majority of the learners choose to have technology and interactive activities integrated into ESP learning (R. Lena, S. Syakirah and M.N. Noor Syamimie, 2019). The aim of this innovation is not just to introduce the idea of integrating Telegram app in ESP teaching and learning process in a larger scale via mobile learning, but also to optimise the use of technology in ESP teaching and learning for future sustainability. This innovation is hoped to stimulate the education revolution from conventional teaching and learning towards the digital technology engagement.

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TELEGRAM: SURVIVOR ESCAPISM FOR LOW-BANDWIDTH LEARNERS

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Highlights: Online teaching and learning has become a new norm in this era especially during the outbreak of Covid-19. With the implementation of Movement Control Order (MCO) in Malaysia, lessons are all moved online as all government and private educational institutions are urged to close. For Universiti Malaysia Kelantan (UMK), all teaching and learning are made online by using the LMS E-Campus platform. However, this has caused some challenges in teaching and learning when there are bandwidth constraints among the learners. To help the low-bandwidth learners, Telegram app is fully utilised among this group in teaching and learning during the pandemic.

Key words: *Telegram, Low-bandwidth learners, Covid-19, online teaching and learning*

Introduction

Year 2020 has marked a hard year for countries across the world. Malaysia started its implementation of Movement Control Order (MCO) on 18th March 2020 as a move for containment of Covid-19. Many industries are closed and activities are restricted. As a result, lessons have to move online due to the closure of all government and private educational institutions.

For higher education, Universiti Malaysia Kelantan (UMK) per say, online teaching and learning has been im- plemented since 14th April 2020 with the formal announcement from the authority. LMS E-Campus is used as a formal platform for all online lessons as all students are back in their homes. However, such new trend has caused some challenges not just for the educators, but also the students. When students are out of campus, they have no more robust wired and wireless networks. The most critical issue faced by the local and international students is the prob- lem of low-bandwidth, especially those who stay at the remote area. Bandwidth constraint is always an obstacle for these group of learners. Apart from internet accessibility due to staying at the remote area, weather and limited data plan are also other problems that cause low-bandwidth among the students. Existing E-Campus page con- sumes a lot of time and data to load. Although with the effort of 1GB free data plan sponsored by the government, still, these group of students are having hard times using E-Campus for their online learning.

In order to cater low-bandwidth problems among the students, Telegram app is introduced as an emergency and an alternative to replace E-Campus. Telegram app is used considering all students nowadays are equipped with smartphones and it is free to download. Unlike other social messaging apps, Telegram is chosen as users can send all types of file up to 1.5GB and everything will be stored at Cloud without interfering the phone storage. Instruc- tors can send big files like

e-books, articles, videos and audios which are of essential for English language teaching and learning. Users can also access the messages and files from several devices at once as it is seamless sync. Henceforth, Telegram app is of great useful for blemished bandwidth.

Basically, this innovation is to promote a set of teaching and learning framework for bandwidth constraints among English for Business Communication students especially during the pandemic. For English for Business Com- munication course, there are three main skills being focused throughout 14-week, namely reading, speaking and writing. In order to help these low-bandwidth learners, some careful planning and changes have been made and adjusted (Refer Figure 1). This proposed framework consists of three main components – Lecture/ Tutorial, Practices and E-Assessment. Unlike high-bandwidth learners, teaching and learning for low-bandwidth learners focuses more on asynchronous rather than synchronous. However, this design does not affect the quality of teaching and learning for the course as there are variety ways and tools being used. Synchronous activities are always being applied to ensure the interactivity, active interaction and real time discussion happen in each of the topic or skill learned among the learners and the educators via Telegram app. Although immediate feedback from the instructors cannot be conducted via video conference, feedback in text messages and/ or voice messages are shared directly using Telegram app. Such tradeoff is needed as to take care of low-bandwidth learners so that they can somehow en- gage and 'survive' in teaching and learning not just restricted during MCO but also in online teaching and learning in the future.

In conclusion, advanced and careful planning is of great paramount for low-bandwidth learners as frequent use of high-bandwidth technologies can affect learners' engagement and participation in a course as they will defi- nitely feel that they are the left behind ones. Often, such situation can trigger learners' shamefulness and anxiety which can further jeopardise their learning and eventually give up in learning. It is hoped that this innovation not just contributes a big impact on online teaching and learning that is inclusive and effective for low-bandwidth learners but also as a guideline for the educators, schools and universities when dealing with online teaching and learning.

Table 1: Teaching & Learning Framework for Low-Bandwidth Students

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E-PORTFOLIO FOR ACADEMIC WRITING

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Introduction: A modernised version of paper-portfolio is the e-Portfolio. An e-Portfolio comprises an individual's collection of artefacts that demonstrate their abilities and attainments, and is typically accessed and stored on an internet site. The e-Portfolio was implemented as a writing assessment tool in an advanced English course at Universiti Malaysia Sabah (UMS). A demo e-Portfolio is available at https://sites.google.com/ums.edu.my/402demo/home . A video explanation of the e-Portfolio can be viewed at https://www.youtube.com/watch?v=5GKA3xHKCPs

Key words: e-Portfolio, assessment, academic writing

Background of e-Portfolio

In past semesters, paper portfolios were implemented as part of the course assessment in an academic reading and writing course at UMS. However, paper portfolios have drawbacks in terms of portability and shareability. There are also limitations in terms of how promptly feedback can be disseminated and how actively interactivity can transpire on paper. Assessment experience that is largely pen and paper based can be tedious for students as well. Therefore, the e-Portfolio was introduced in lieu of the conventional portfolio. The aim is to create a more engaging assessment experience whereby students can actively communicate about and share their work, and draw from a multitude of digital resources to support their writing. This marked the first time the e-Portfolio was implemented for academic writing at the Centre for the Promotion of Knowledge and Language Learning, UMS.

Description of e-Portfolio

e-Portfolio Framework
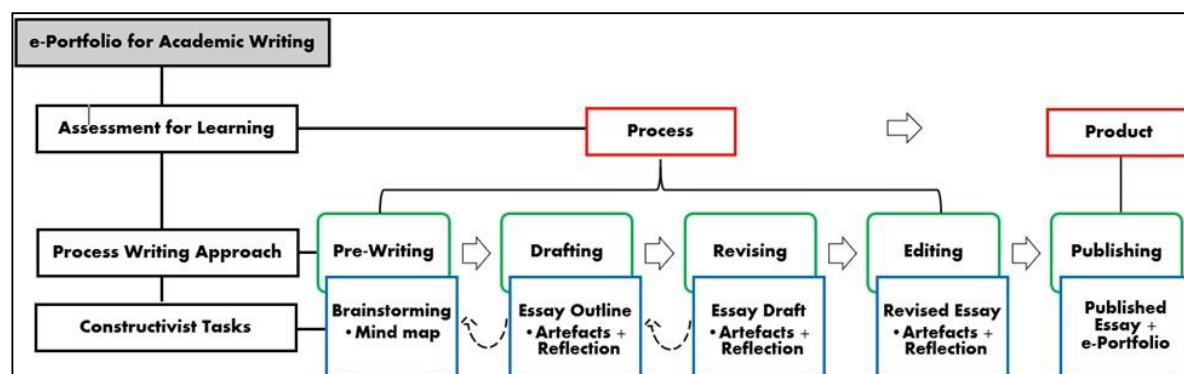
Figure: 1 e-Portfolio Framework Source: Ngui, Pang, Hiew & Tan (2019)

The e-Portfolio in this study has footings in three theories: assessment for learning, the process writing approach, and the theory of constructivism. Assessment for learning emphasises the importance of informing learners about their progress and allowing opportunities for improvement (Stiggins, 2005). Timely communication of feedback via the e-Portfolio can, in turn, create opportunities for students to discuss progress, seek advice, and make revisions. With e-Portfolio, instructors and peers can promptly provide feedback and comments once a student's work is submitted. The process writing approach advocates writing based on a set of procedures such as prewriting, drafting, revising, editing, and publishing (McKensie & Tomkins, 1984). By applying this approach, the e-Portfolio writing tasks are divided into stages, allowing students to draft and revise their work. The stages are prewriting (mind map), drafting (essay outline), revising (essay draft), editing (final essay) and publishing (published essay). The theory of constructivism states that knowledge is actively constructed as a result of individual experiences (McLeod, 2003). The e-Portfolio provides opportunities for learners to express themselves meaningfully via a wide range of artefacts. The artefacts consist of digital resources such as word-processed documents, online articles, and multimedia files. The e-Portfolio is used as a means for reflection when learners provide reasons as to how the artefacts are representative of their learning (Barrett, 2005).

e-Portfolio Procedures

Students compose a problem-solution essay in stages using Google Docs. The essays, artefacts, and reflections are then compiled into an e-Portfolio that is created using the new Google Sites. The assessment is formative since it is conducted over an extended period and the aim is to promote revision as a result of the feedback that the students received. A time period of one to two weeks is allocated in between submissions to ensure that the instructor could provide feedback and the students had the opportunity to improve their work as needed.

Benefits of e-Portfolio

Conventional portfolios are bulky as they generally consist of paper-based materials, making them increasingly obsolete in the modern-day classroom. When enhanced by technology, the e-Portfolio transcends the manual portfolio in aspects of portability, accessibility, and storage.

There is a renewed emphasis on progress as part of assessment since the digital nature of the e-Portfolio enables instructors and students to communicate about work. Data and evidence related to assessment can be distributed effortlessly and widely to stakeholders with an interest in the learners' language competency.

The ability to accommodate a plethora of digital evidences such as links, online articles, and multimedia files also makes the e-Portfolio more relevant since such resources are now vastly available and rapidly circulated. As such, using an e-Portfolio can lead to a more engaging, sustainable, and flexible means of measuring learner progress in language classrooms.

Significance of e-Portfolio in Education

The aim of e-Portfolio is to provide an enhanced assessment experience for students and therefore aligns with the aspirations of the Malaysian Ministry of Higher Education (MOHE). Acknowledging the interdependent link between learning and assessing in English language courses, MOHE proposed the Malaysia English Assessment (MEA) which delineates an ecosystem that can be used to measure university students' English language proficiency (MOHE, 2017). MEA advocates assessing across formal and informal contexts and utilising various resources, for instance, using online resources with learners on and off campus.

The call towards a "future ready curriculum" was made by the Ministry of Higher Education (2018, p. 72) with emphasis on the use of alternative assessments. The theoretical underpinnings of alternative assessment are realised in this study's use of the e-Portfolio in an authentic higher education setting. In our study, it is proven that the use of alternative assessment can make a positive impact on student progress as the undergraduates' demonstrated improvement in the skill of academic writing (Ngui, Pang, Hiew & Lee, 2020). Using alternative assessments such as the e-Portfolio in higher education can reduce the pressure of high-stakes testing and encourage students to acquire technology skills that benefit them in the long run.

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INTERACTIVE VIRTUAL REALITY LEARNING EXPERIENCE

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Highlights: In light of rising concern about the spread of COVID-19, a growing of education institutions have shut down their face-to-face classes globally. This sudden migration from face-to-face to remote learning has caused various challenges which includes difficulties in controlling online classes, less engagement and no physical field trip. To tackle this issues, educators are forced to find attractive online learning platforms. One of the most powerful online learning platforms is Nearpod. Nearpod help to revitalizes professional learning content and cultivates classroom-changing strategies for educators.

Key words: nearpod, interactive virtual reality, learning, experience, a synchronous

Introduction

The spread of COVID-19 has sent shock reactions throughout the globe. This pandemic has affected almost all areas, including the economy, businesses, social life, and politics. The educational systems were abruptly disturbed too. In response to lockdown procedures due to the pandemic impact, higher education institutions (HEIs) such as universities are forced to close their premises (Schleicher, 2020). Around 1.598 billion students were affected and required to stay at home due to their educational institution's close at all levels in 194 countries. (United Nations Educational, Scientific, and Cultural Organization (UNESCO), 2020).

Many HEIs set out their endeavors to use technology to encourage remote learning, distance education, and online learning during the COVID-19 pandemic (Owusu-Fordjour, Koomson & Hanson, 2020). However, this massive shift towards online learning presents many challenges to school management, educators, parents, and students alike. Among the problems faced include

difficulties in controlling online classes, run active learning tasks, dealing with distraction, and drop in student engagement. Such issues have reminded educators that effective online learning can only happen when we are engaged, energetic, and focussed. Therefore, educators have to find the right tools to ensure online learning is conducted smoothly and interestingly.

Nearpod is the best solution to keep the lesson interactive and fun. The authors decided to use Nearpod in tourism subjects as it provides flexibility to the educator in delivering engaging online lessons at student-paced or educator-paced. By having Nearpod as a tool in delivering lectures, the authors find out that the student interactions are soared, and the students are motivated to participate in class even when there is a poor internet connection.

Background of the innovation and product development

Typically, authors used normal PowerPoint presentation when delivering lectures on tourism subjects. However, this slides presentation is viewed as boring and common place as it fails to capture students' interest or to excite them. But with Nearpod, authors are able to excite students, it allows authors to upload their presentations and add interactive activities to complement the learning experience in the online classroom. Following are some of the approaches used by the authors:

Field trip (virtual reality)

Authors decided to use virtual field trip features in Nearpod as it allowed tourism students to travel to any place in the world virtually during pandemic. Students can explore virtually the world-famous landmarks, wonders of the world, national monuments, world heritage sites, and many more, which complement the learning objective. During the VR Field Trip, students will be able to explore a 360 image of all tourist attraction on their own device. They can rotate around their devices and zoom the image to explore different tourist attraction with different angles.
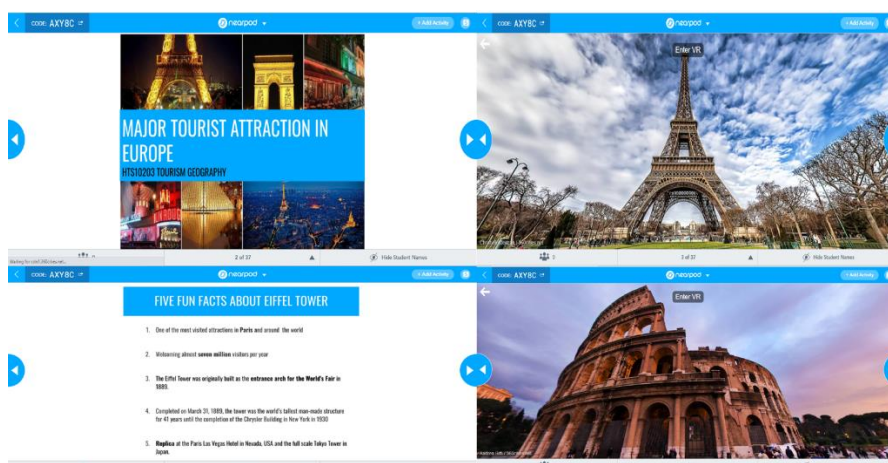
Figure: Examples of VR in HTS10203 (Tourism Geography)

Interactive Formative assessment

Authors add activities such as real-time formative assessment in their lessons to test students' understanding of subject matters. Usually, authors will include quizzes, polls, fill-in-the-blank, matching pairs in their lessons. Sometime, Authors also used features like "collaborate" where students can write virtual post-its about their thought on particular topic. Authors used this feature as it allows them to get real-time feedback and post-session reports. This instant feedback allows authors to identify and help students who have misconceptions on the subject matter quickly.
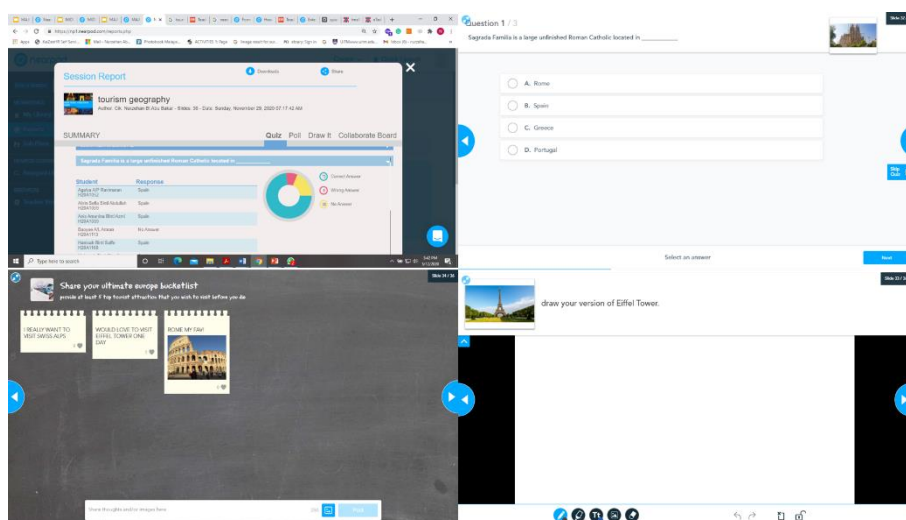
Figure: Interactive formative assessment used in HTS10203 Tourism Geography subject

Student-paced VS Educator-paced options

The best part about virtual reality learning is that it offers two delivering options: Student-paced and Educator-paced. The author drives the Live Lessons for Educator-paced, where authors can share it through google meet or zoom; meanwhile, the Student-Paced Lessons give the students the power to navigate through the lesson at their own pace. This gives authors the ability to control the lesson's pace based on the authors' limitations and time.
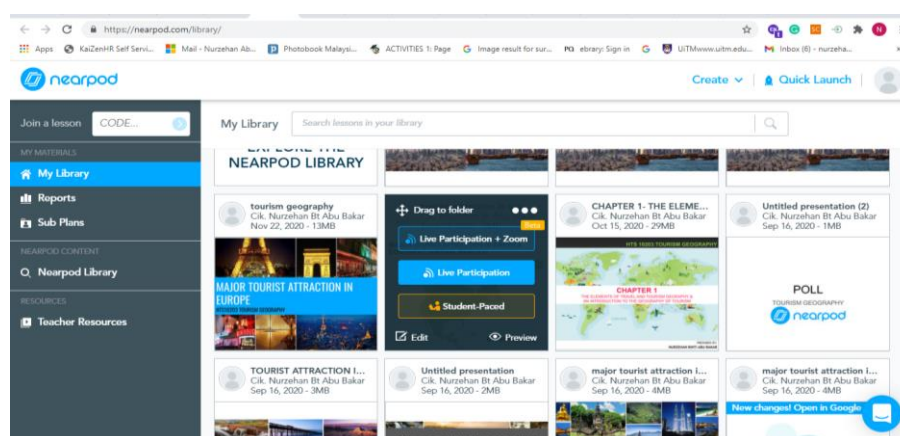
Figure: Launching options in virtual reality learning platform

Commercial Value

Nearpod is not only suitable to be used in tourism subjects. But it can be shared as a great educational lessons in any kind of teaching and learning. It is suitable for any students' level, either they are in pre-school, primary school, secondary school, or tertiary level.

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TRANSFORMASI KAEDAH PDP KURSUS PENERBITAN RADIO SELEPAS SETAHUN PANDEMIK COVID-19

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Highlights: Covid-19 telah merubah norma pembelajaran dan pengajaran (PdP). Kursus Penerbitan Radio memerlukan pendedahan setara industri mengalami kelumpuhan apabila pelajar tidak dibenarkan hadir ke studio radio. Setahun lebih kursus ini melalui fasa eksperimen dalam menentu dan memilih kaedah terbaik dalam memastikan CLO tercapai. Dalam konteks ini adalah CLO1. Rentetan daripada permasalahan yang telah dikenalpasti dalam kalangan pelajar Sem 1, sesi 2020/2021, sebuah inovasi iaitu UMS fm Protégé dengan kerjasama UMS fm ditubuhkan. Ia adalah sebuah platform Podcast yang mana tugasan pelajar boleh disiarkan menerusi Spotify bagi menggantikan suasana *on-air* dalam studio. Teknik ini dicadang diaplikasi bagi pelajar Sem 1, sesi 2021/2022.

Key words: Transformasi, UMS fm Protégé, CLO, radio, Modifikasi, P&P.

Pengenalan

Impak Covid-19 bukan sahaja menggugat keadaan ekonomi dan politik dunia, sebaliknya ia turut menganggu institusi pendidikan. Bagaimanapun, bukan semua bidang ilmu terganggu, hanya epistemologi tertentu. Di Universiti Malaysia Sabah, menerusi kursus AK20703 (Penerbitan Radio 1), selama 22 tahun kursus tersebut mengamalkan *final assessment* sebagai kaedah penilaian. Bagaimanapun, akibat daripada *convergence* dan pendigitalan, eko-sistem radio mengalami perubahan baik dari aspek penerbitan dan pengedaran. Oleh itu, seperti yang dicadangkan oleh Puentedura (2021) menerusi Model The SAMR, kursus ini mengalami modifikasi dari penilaian *final assessment* kepada *continuous assessment*. Sejak berlakunya transformasi tersebut, sesi praktikal dijalankan di Kampus kita FM (kini UMSfm).

Bagaimanapun, hanya pelajar bagi Sem 1 sesi 2018/2019 dan sesi 2019/2020 yang mengalami pengalaman menjalani sesi praktikal di UMS fm. Pelajar sesi 2020/2021 terjejas akibat senario Covid-19. Maka timbul persoalan seperti, bagaimana kursus tersebut dijalankan ketika pandemik? Bagaimana kursus penerbitan ini beradaptasi dan meneruskan proses PdP menerusi pembelajaran atas talian? Bagaimana CLO tersebut boleh dicapai?

Pendekatan PdP Sebelum & Selepas Covid-19
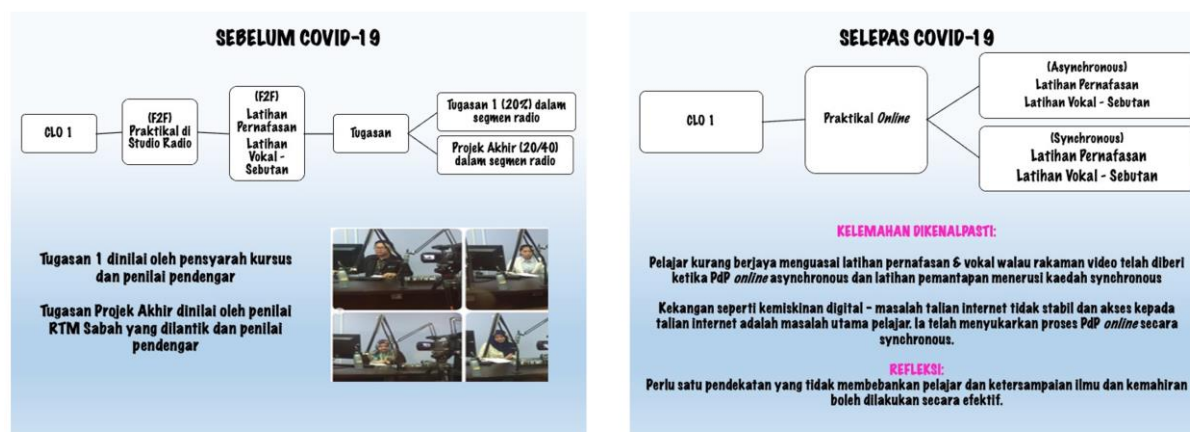
Rajah 1: Pendekatan PdP Sebelum & Selepas Covid-19

CLO1 bagi kursus ini adalah untuk menghasilkan pelajar yang berupaya untuk *demonstrate competency as a radio announcer through a radio segment* (A3, PLO5). Amalan sebelum Covid-19, pelajar menjalani sesi praktikal secara bersemuka di studio UMS fm. Setiap kesilapan teknik pernafasan dan ketidakjelasan vokal dapat diperbaiki secara bersemuka ketika sesi praktikal. Kemudian, penilaian bagi CLO1 dibuat secara *live* di konti radio.

Namun, selepas Covid-19, cabaran hebat dalam memastikan ketercapaian CLO1 adalah PdP atas talian. Pelajar sesi 2020/2021 adalah kumpulan pertama yang menjalani proses PdP atas talian bagi kursus ini. Berdasar pemerhatian dan pengalaman PdP atas talian, kelemahan dan kekangan telah dikenalpasti dalam proses perpindahan kemahiran kepada pelajar. Pelajar kurang berjaya menguasai latihan pernafasan dan vokal walau rakaman video telah diberikan ketika PdP *online asynchronous*. Contoh, teknik bernafas seperti menarik nafas dalam dan menghembus nafas, bahu pelajar tidak boleh bergerak.

Selain itu, kekangan seperti kemiskinan digital di Sabah adalah isu yang tidak boleh dielakkan. Ketika PdP online synchronous berlangsung, perkara seperti masalah talian Internet tidak stabil dan akses kepada Internet adalah masalah utama pelajar. Ia telah menyukarkan proses PdP. Oleh itu, satu pendekatan yang holistik perlu diambil bagi mengatasi kelemahan yang dinyatakan diatas.

Inovasi: Pendekatan One-to-One dan UMSfm Protege

Rentetan daripada kelemahan yang dinyatakan di atas, pendekatan one-to-one adalah antara pendekatan yang difikirkan holistic dan efektif dalam meningkatkan kemahiran pelajar terhadap latihan pernafasan dan vokal bagi membolehkan CLO1 dicapai 100%. Maksud pendekatan one-to-one adalah merujuk kepada seorang (1) pelajar diperuntukan 10 minit bagi setiap sesi praktikal untuk menunjukkan kemahiran dan prestasi masing-masing. Oleh itu, dalam sebuah sesi praktikal satu (1) jam hanya 5 orang pelajar sahaja dibenarkan. Ini penting bagi memastikan pelajar faham dengan kemahiran yang dipelajari.

Rajah 2: Solusi kepada pemantapan kaedah PdP

Pendekatan *one-to-one* ini penting bagi memastikan setiap ilmu dan kemahiran dapat disampai, difahami dan dapat ditunjukkan oleh pelajar. Pengalaman yang lepas menunjukkan bahawa kaedah *asynchronous* tanpa disusuli bimbingan sesi s*ynchronous* sesi praktikal adalah antara penyebab pelajar kurang dapat menguasai kedua-dua teknik tersebut. Apabila setiap pelajar dihimpunkan dalam sesi latihan *synchronous*, capaian Internet di Sabah sering menjadi isu untuk pelajar kekal berada atas talian sehingga akhir sesi.

Podcast merupakan solusi terbaik dalam membantu PdP bagi menggantikan sesi penilaian bersemuka di konti radio. Penilaian pelajar boleh dinilai secara terus dan atas talian oleh penilai industri dan penilai pendengar yang telah dilantik oleh pensyarah. Teknik ini juga bukan sahaja memberi sumbangan kepada UMSfm Protégé dari aspek pembinaan kandungan siaran, malah dapat membantu *visibility* UMSfm di mata dunia.

Kesimpulannya, kaedah ini digunakan setelah melalui pengalaman setahun PdP dalam suasana pandemic Covid-19. Bagaimanapun, pensyarah merancang untuk mengaplikasi kaedah ini pada Sem1, sesi 2021/2022.

Penghargaan

UMSfm dan UMSfm Protege

Rujukan

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BRIDGING THE THEORY-PRACTICE GAP WITH DARE: LAND OF LIGHT

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Highlights: "DARE: Land of Light" is a project that forms part of the MERLIN research programme in which the physical learning space is transformed through the use of various Extended Reality (XR) technologies. This exhibition presents Phase 1 of the project which includes the development of the mobile Augmented Reality (AR) application as well as preliminary perception of students towards the application. The AR application uses Authentic Learning as the pedagogical framework and focuses on supporting creative multimedia students in their learning of the topic "lighting in 3D modelling".

Key words: Augmented Reality, Authentic Learning, Interactive Learning Environments

Introduction

Educators around the world have been exploring the use of emerging immersive technology collectively known as Extended Reality (XR) to create engaging and immersive learning experiences and adoption of these technologies have been steadily gaining traction (Becker, Brown, Dahlstrom, Davis, DePaul, Diaz, & Pomerantz, 2018). With the rapid shifts in the industry and new generation of digital native learners, there has been a need to ensure learning environments are designed to engage these new learners through the digitization of learning and to prepare them with the right skillsets to thrive in Industry 4.0 (Tvenge & Martinsen, 2018; Pousson & Myers, 2018; Schwieger & Ladwig, 2018). Augmented Reality (AR) technology presents one possible approach under the umbrella term of XR to help bridge the gap between theoretical knowledge and practical application. Research has found that AR, when applied with proper pedagogical framework such as Authentic Learning elements, is able to create a learning environment that provides students opportunities for more interactivity and supported the gaining of real experiences (Cai, 2018).

The Project: "DARE: Land of Light"

The "DARE: Land of Light" AR mobile application is an extension of a previous award-winning research project called The DARE Project. The application was developed using UNITY, and designed with Authentic Learning elements as the pedagogical framework. The 9 Authentic Learning elements as outlined by Herrington, Reeves, and Oliver (2014) were used to guide both the design and the use of the application as a support tool in the classroom. In terms of technical development, the team redesigned the application based on lessons learnt from the previous project. Firstly the AR application is now designed to be "markerless" which allows students to use the application without the need for a physical marker to trigger the AR components. The

application also utilizes GPS plugins which overlays the game content onto the physical environment using the device's camera. These updates now allow students to explore the game using their own environment or the learning space, adding a layer of immersive interactivity and provides flexibility. The topic chosen for this project is "lighting in 3D modelling" which is a fundamental topic that all design students go through when learning 3D modelling. The application consists of three main sections: 1. "Learn" – where students can watch short 1 minute infographic-style videos that recap the key concepts of the topic, 2. "Explore" – where students can explore the key concepts that are visualized through AR activities, and 3. "Play" – where students can test their theoretical understanding and application of these theories into problem-solving scenarios.

Traditionally 3D modelling subjects are taught to students in a computer lab as it is a technical subject. The lecturer would teach both theoretical concepts as well as technical modelling skills to students. This AR application is meant to help support the students' learning of these theoretical concepts in the classroom or in a "makerspace" where students come together to work on group projects. Students are able to very quickly explore the key concepts through AR, for example in the concept of "3 point lighting" the app helps to visualise in real-time the changes that happen to a 3D model when the surrounding 3 point light set up is manipulated, without needing to render the outcomes (see Figure 1). Students can also attempt to solve the scenarios presented as RPG-style quests in the "Play" section individually or as a group. This gives students a fun way to consolidate everything they have learnt during class.
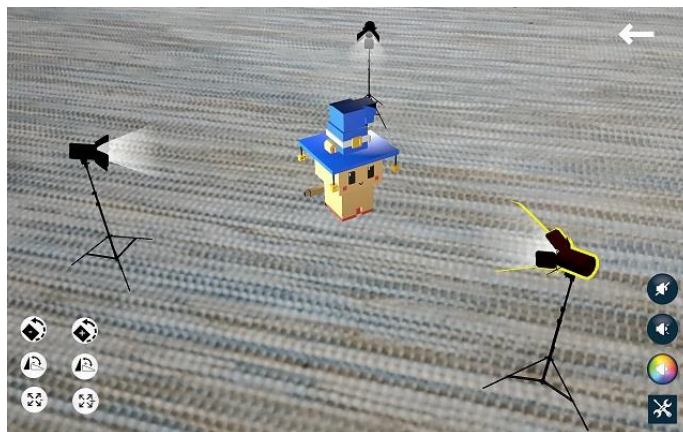
Figure 1: Screenshot of learning content visualised in AR

As this project is part of a larger research programme called MERLIN, the application is also supported by other research projects in MERLIN. Students who go through the AR application and find that they still have difficulty understanding the topic will be prompted to access a chatbot through the MERLIN learning platform to ask questions about the areas they don't understand. Students will also be able to view their progress and achievements that are tracked through the MERLIN learning platform. This exhibition showcases Phase 1 of the research project, whilst Phase 2 will look at the usage of the "DARE: Land of Light" application in a "makerspace" that is currently being set up at the Faculty of Creative Multimedia at Multimedia University. Phase 2 will primarily focus on the effectiveness of the application in supporting creative multimedia students especially their creative problem-solving skills when they are working together on group projects in the "makerspace". As a standalone application, this AR application has been designed to be easily marketed to a wide range of audiences through the Apple App Store and Google Play Store.

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CONTACTLESS TOPOLOGICAL SURVEY IN LANDSCAPE ARCHITECTURE COURSE USING DRONE

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Highlights: Topology study is one of the attributes in the site inventory and analysis for landscape architecture studio course. The study requires students to make their judgement on the topology of the site according to SWOT analysis. This traditional way of analysis is based on perception of students which may inappropriate and requires a lot of time. This innovation in teaching presents the alternative of performing inventory analysis of topology study using drone and Agisoft. The outcomes present that using drone and Agisoft are more presentable and systematic where the value is easily visualizing and spatially identified on map.

Key words: Drone, Agisoft, topology study, site analysis, studio project, landscape architecture.

Introduction

Courses with studio based in Landscape Architecture Program involved with topological inventory and analysis. Conventionally, students require to visit the site to gather the topological information of site as site inventory and analyze the information based on their judgment according to strength, weakness, opportunity and threats which known as SWOT analysis. This traditional way of analysis is based on perception of students which require a lot of time. This study presents the alternative of performing inventory analysis of topology study using Agisoft.

Agisoft is software developed to elicit the information from the coordinated images. The images are required to collect by students during field study. The method for gathering the coordinated images is by performing flight plan using drone and PrecisionFlight apps. On March 2021, ten of second year students from Bachelor of Landscape Architecture Program completed their field study at Bandar Pasir Mas, Kelantan for their final project. The innovation involves with three stages, namely, (i) flight plan stage, (ii) flying stage, and (iii) mapping stage. Firstly, flight plan process is where students perform flight plan using PrecisionFlight apps. This stage students plan selects their study area and control the height of drone to be flying. After first stage is complete,

flying stage is performed by connecting the flight plan in PrecisionFlight with drone. The process took about 15 to 20 minutes. For big area, the process requires more than a flight plan. Finally, the images are gathered in Agisoft. Using Argisoft, mapping of the site is generated. The software produces information of topology such as mapping and contour of the landform.

The outcomes from presented by the hands-on activity using drone and Agisoft software are more presentable and systematic where the value is easily visualizing and spatially identified on map. Accordingly, the time for students to complete their tasks can be shortening and at the same time achieve the learning outcomes. Students learned the alternative technique and process on how to conduct the inventory and analysis on topology. The technique and process improve students' skills on conducting tools and preforming systematic analysis. Inventory and analysis on topology study have their own value in market especially in earth observation discipline such as mapping, 3D model, and landform evaluation.

Content

The innovation involves with three stages, namely, (i) flight plan stage, (ii) flying stage, and (iii) mapping stage. Firstly, flight plan process is where students perform flight plan using PrecisionFlight apps. This stage students plan selects their study area and control the height of drone to be flying. After first stage is complete, flying stage is performed by connecting the flight plan in PrecisionFlight with drone. The process took about 15 to 20 minutes. For big area, the process requires more than a flight plan. Finally, the images are gathered in Agisoft. Using Argisoft, mapping of the site is generated. The software produces information of topology such as mapping and contour of the landform.

What is the context or background of the innovation / product development / design / process?

An unmanned aerial vehicle (UAV) or Drones is an aircraft that carries no human pilot or passengers. Drones can be fully controlled remotely by students in doing data collection for site inventory.

PrecisionHawk's PrecisionFlight mobile app used for DJI drone as an advanced remote controlling tool in creating the flight plans and capture aerial imagery.

Agisoft Metashape is a stand-alone software product that performs photogrammetric processing of digital images and generates 3D spatial data to be used in doing data analysis for topological studies.

Why are they important to education?

UAV or drone is a method of using technologies in teaching which advancing the site inventory and analysis of a landscape architecture project to the next level.

Replacing the photography technique to more systematic and coordinate create the information more accurate and other unnecessary issues can be avoided. This method is safer, cheaper, and faster than conventional method. With this, students shall focus on designing process more.

This method can further develop to a teaching module using drone which can be used for training students, lecturers, practitioners. The training can be charge with suitable fee.

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EDUCATION 5.0: THE APPLICATION OF G-V-C APPROACH FOR UNDERGRADUATES' VIRTUAL LEARNING

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Highlights: Presently, Malaysian undergraduates were found lack of soft skills including creativity, communication, critical thinking and digital skills as well as low proficiency in the English language. A combination of blended learning and traditional learning technique such as Gamification, Video creation, and Case study practices (G-V-C approach) is an effective learning platform to allow students to collaborate, work on problems and creatively find its solutions. This study analyses students' engagement in learning Organisational Behaviour using G-V-C approach. Results show these learning approaches have a positive impact on improving students' academic performance and their full engagement towards the subject learned. It also cultivates student's creativity, critical thinking, communication, collaboration and computational thinking (5Cs), which in line with Malaysia Higher Education Blueprint 2015-2025 that aims to prepare future-proof graduates ready for Industrial Revolutions 4.0.

Key words: *Video creation, gamification, case study, digitalisation, blended learning, Industry 4.0*

Introduction

Malaysia aims to provide inclusivity and quality education to various levels of society. It is moving towards globalised online learning that harnesses technology-enabled innovations and education which bridges personalised learning experiences to all students to become a highly skilled and competitive employee in the future.

Teachers are playing a vital role in preparing students for adopting new challenges in line with the Fourth Industrial Revolution (IR4.0) and Education 5.0. As more and more businesses embrace the IR4.0 and digitally transform their businesses, it is found that three learning approaches, namely active learning, project-based learning, problem-solving, and inquiry with opportunities to engage with the real world should be a practice in the country (Zakaria, 2017). In line with the 12th Malaysia Plan, i.e., well-positioning our future leaders to compete in a global marketplace that will be dominated by Industry 4.0. Today, students are given the freedom to customise their learning process through blended learning. Therefore, the undergraduate is now a virtual commodity and must up to meet the needs of an ever-changing world.

A G-V-C approach can contribute to a successful and highly enjoyable learning experience and support intense engagement in the activity. This study aims to promote higher-quality programmes that use experiential and technology-enabled learning models to offer more personalised and engaging learning experiences that push the limits of student's potential and motivate students to learn more dynamically and interactively in a lecture-style format. It also provides students with the opportunity to creatively interact with their peers and increase their passionate interest in the subject matter itself.

G-V-C Approach in Virtual Learning

First-year students who took the Organisational Behavior subject in the short trimester were assigned to create a video based on the topics given and applied it in a real-world scenario, and they are guided to prepare a storyboard and script write-up based on the template given. The discussion on the video making was conducted twice a week. The formative assessment and summative assessment were used to monitor and evaluate their learning. Online group discussion board (Padlet), and case study practices were used to examine the effectiveness of subject learning techniques. Besides, an educational game-based platform, Kahoot! was introduced to the students before and after the chapters were covered to allow them to answer questions individually in an interactive learning environment. Online data collection from Google form on the effectiveness of the G-V-C approach was also collected and analysed. The findings show that 60.5% of the students agreed that completing the video has helped them to consider working hard and being knowledgeable in the topic of research and 46.9% of them also perceived that learning using a case study makes them get to know more about the real world. At the end of the trimester, the majority of the students performed exceptionally well in this subject where 64.2% of them get grade A, while 32.1% in grade B and 3.7% in grade C.

This innovative G-V-C approach enables effective collaborations among students, allowing them to contextualise learning within their learning experience as well as increase their enjoyment at the same time. It also facilitates student's adaptive quotient (AR) development and motivation to learn more. It also cultivates student's creativity, critical thinking, communication, and problem-solving, personal and social competencies. Besides, it helps to improve their English proficiency through scriptwriting and video creation and case study write up, which prepare the students ready for Industry 4.0 through adopting computational thinking skills to solve complex issues efficiently. Also, it helps to create competition between students and others through gamification learning activities and enables the teacher to personalise instruction for handling different paces/styles of learning.

The G-C-V approach is marketable and can be applied to business-related courses and conduct this active learning strategy not just in face-to-face classes, but also in blended or distance learning via micro-credentials. Education should invest in people who understand technology which leads our generation to have digital skillsets in today's ever-changing business environment. The lecturer can conduct a knowledge transfer programme on this approach and guide and share to the other academics to adopt it for their students to become much more advanced in computational thinking skills. Besides, the well-designed questionnaire can be used to apply for intellectual property status for value added purpose.

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E-PORTFOLIO FROM GOOGLE SITES AS NEW ASSESSMENT METHOD FOR LANDSCAPE ARCHITECTURE DESIGN STUDIO

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Highlights: E-portfolio from Google Sites is a platform to assess the final projects of 22 students of Landscape Architecture program. By only accessing the link of Google Sites provided by the students, lecturers and external panels able to access and assess the students' works at anytime and anywhere without having to download into their computers. Besides assessment, e-portfolio is another way for students who are in studio-based courses to preserve their final projects and use it during job seeking and interview with their potential employers because it guaranteed a comprehensive information about what they have went through during their studies.

Key words: e-portfolio, final project, studio-based courses, google sites, e-assessment, Landscape Architecture

Introduction

In Landscape Architecture Program in Universiti Malaysia Kelantan, it has been a practise for several semesters for students to print-out A1-sized boards as their portfolio especially in studio-based courses to be used as their final assessment. This portfolio contained the student's final project which includes the understanding of studio theme for that current semester, their design proposal and all the practical skills acquired throughout the semester. However, as Malaysia has gone through pandemic and required the teaching and learning to go online, the use of e-portfolio has replaced the previous practise and it started being used for Landscape Architecture Program Semester February 2019/2020 as the e-assessment. Google Sites was chosen as the platform for e-portfolio for 20 third year students and it has become a practise until now for all studio-based courses in Landscape Architecture Program.

E-portfolio or an electronic portfolio is defined as a systematic learning tool of assessment in which students uploading their final projects through reflection and showcase achievement to lecturers (Chang et al., 2019). Instructors can easily evaluate and assess the submitted work using a range of feedback mechanisms including document mark-up, voice recording, rubrics and in-line commenting. E-portfolio is a learning theory known as social constructivism, which proposes, in part, that learning happens most effectively when students construct systems of knowledge for themselves through uploading their final projects (Mapundu & Musara, 2019). E-portfolio has been used widely and successfully in both learning and assessment not only in the Arts, Humanities and Social Sciences disciplines but computer science and engineering education have also been introduced to the concept of e-portfolios. The advantages e-portfolio includes the opportunities to integrate student course work and the potential for development of information management, self-organisation, planning, and presentation skills (Barret, 2001; Bhattacharya, 2001; Nardi, 1996).

In Landscape Architecture program, e-portfolio from Google Sites benefits both students and lecturers during final assessment as it is easily accessible online. The lecturers and external panels able to assess at anytime and anywhere without having to download those documents to their computers. With the assistance of Google Meet, students able to present their works online by accessing the link from the Google Sites and received feedbacks from both lecturers and the external panels concurrently. It is also a convenient and yet a sustainable medium for preserving the students' works and can be used for references in the future studio as they required no physical storage. The conventional approach of print-out portfolio may lead to improper storage and wastage of materials due to various reasons after the semester ended. By replacing the conventional approach, students are able to store their works properly and ready for online exhibition if they publicize the works to the community. The community could also learn about the profession of a landscape architect through online. In terms of commercial values, e-portfolio exposes a larger chance for employability and marketability of the students as it shows their capability to use technology to present and handling their works efficiently (Issa, 2018) to the potential employers during the job seeking and interview session. Skills such as cognitive skill, ethic and professionalism, digital and communication skills are developed and shown with the use of e-portfolio. Besides, e-portfolio is another way to sell their ideas and skills to any parties that interested with their works while browsing the internet.

In conclusion, the use of e-portfolio is not only beneficial during the assessment in teaching and learning process but it is a life journey tool as it is a medium to promote students' ideas, skills and ability to produce design proposals based on what they have studied throughout the years of their degree program. Therefore, e-portfolio is a practical and comprehensive tool for studio-based courses.

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P&P LOW BANDWIDTH: KEBERKESANAN PENERAPAN PLATFORM MEDIA SOSIAL DALAM PELAKSANAAN TUGASAN PELAJAR

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Kata kunci: akses, aplikasi, covid-19, norma baru, pembelajaran, sosial media

Pendahuluan

Pandemik Covid-19 memberikan impak yang besar kepada pelbagai sektor terutamanya dalam bidang pendidikan. Sistem Pendidikan Tinggi di Malaysia juga mengalami pelbagai perubahan. Manakala pensyarah juga terpaksa bekerja dari rumah. Akan tetapi dengan adanya teknologi di hujung jari dan tanpa sempadan telah menggantikan pembelajaran secara konvensional kepada pembelajaran alam maya. Pensyarah telah menggunakan platform pembelajaran dalam talian untuk pengajaran, berinteraksi dengan pelajar dan memberi latihan secara maya. Pelajar mempunyai akses kepada peralatan teknologi meskipun terdapat juga pelajar yang mempunyai kekangan dengan kekuatan jaringan internet yang rendah di kediaman masing-masing dalam tempoh Perintah Kawalan Pergerakan (PKP). Namun begitu, pelajar masih boleh menggunakan jalur lebar yang berkapasiti rendah seperti *Whatapps* dan *Facebook*. Hal ini kerana ekosistem digital p&p telah diteliti secara holistik berikutan norma baru dan keberkesanan pelaksanaan pembelajaran maya telah mengubah persepsi untuk menerimanya secara radikal seperti pembelajaran yang telah berlaku dalam kursus Konservasi II (Non-Organik). Berdasarkan kepada keputusan penilaian pelajar yang telah dilaksanakan, hasil dapatan kepada penggunaan media sosial yang telah dilaksanakan selama 14 minggu menunjukkan impak yang positif. Hal ini terbukti dengan penghasilan *Coffee Table Book* dan Video Dokumentari dengan melaksanakan proses p&p melalui alam maya. Kesimpulannya peranan teknologi dalam pendidikan banyak memberikan kelebihan dan kemudahan di samping menyediakan suasana pembelajaran yang lebih menyeronokan serta sangat sesuai untuk diaplikasikan kepada pelajar dalam mengambil bahagian berdasarkan pengalaman pembelajaran komprehensif dan lebih realistik.

Kandungan

Inovasi dan Pembangunan Produk

Unsur-unsur utama dalam kepelbagaian media sosial merangkumi kawalan pengguna terhadap penyampaian maklumat dan interaktiviti yang digunakan untuk meningkatkan proses pembelajaran. Menurut Cairncross & Mannion, 2001 juga, p&p dapat digabungkan dengan contoh ilustrasi, penilaian dalam talian dengan maklumbalas dan pelajar berpeluang untuk berlatih dan bereksperimen. Proses ini turut berlaku dalam subjek Konservasi II (Non-Organik)

dan Rajah 1 dibawah menunjukkan projek akhir pelajar yang yang dihantar melalui *Whatapp* dan dipaparkan melalui *Facebook* bagi tujuan penilaian.
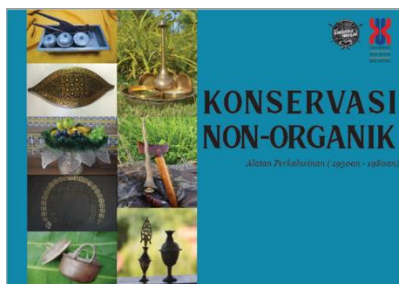
Rajah 1: Projek Pelajar *Coffee Table Book* Bagi Tujuan Penilaian

Rajah 2: Projek Akhir Pelajar Yang Dipamerkan Di Facebook Untuk Tujuan Penilaian

Latar Belakang

Penyampaian maklumat yang berkesan dalam pembelajaran jalur lebar rendah telah diakui dan memudahkan semua pihak. Ia disokong oleh Hidayat & Shafie, 2020, yang hasilnya menunjukkan platform pengajaran dan pembelajaran utama adalah *Whatsapp* diikuti dengan Google Classroom dan Telegram dan disokong oleh aplikasi media sosial yang lain. Majoriti pensyarah menjalankan pengajaran dan pembelajaran menggunakan interaksi segerak (PKP fasa 1 = 90% manakala PKP fasa 2 = 86.80%). Sementara itu, interaksi tak segerak juga dilaksanakan mengikut keperluan masa dan tempat (PKP Fasa 1 = 10% dan PKP fasa 2 = 13.20%). Menurut hasilnya, dapat disimpulkan bahawa pembelajaran jalur lebar yang rendah menggunakan media sosial sangat membantu proses pengajaran dan pembelajaran pelajar dan pensyarah.

Projek akhir yang telah dilaksanakan menggabungkan beberapa elemen yang disebut oleh Laurillard (1998) seperti elemen multimedia yang mengandungi grafik, video, suara, animasi dan teks. Kaedah ini dilihat sebagai kaedah terbaik dalam menyampaikan maklumat. Facebook juga, telah menjadi medium utama dalam proses penyerahan tugasan dan pada masa yang sama dapat mempromosikan penemuan pelajar dalam usaha mereka dalam melestarikan bangunan warisan dengan mempertimbangkan garis panduan yang dicadangkan oleh A. Ghafar Ahmad (2006) seperti nilai sejarah, warisan, seni bina, usia, fungsi, bahan binaan dan penyelenggaraan. Oleh sebab itu, universiti memilih kaedah dalam talian sebagai kaedah alternatif untuk mengekalkan

pendidikan (Adnan, 2020). Menurut Kementerian Pelajaran Malaysia, 2012, inovasi dalam pengajaran dan pembelajaran dapat diklasifikasikan sebagai salah satu usaha dalam mempelbagaikan kaedah atau pembaharuan dalam proses meningkatkan sistem pendidikan di samping menyokong kepada garis panduan Pendidikan pada abad ke-21. Menurut Muh Rais, 2015, pengaruh penggunaan multimedia dalam pembelajaran telah memberikan kesan positif terhadap pengembangan pengetahuan.

Kepentingan Kepada Pendidikan

Dalam memastikan proses pendidikan tidak berhenti walaupun dunia telah dikejutkan dengan wabak Covid 19, pelbagai usaha telah dilakukan, termasuk penggunaan visual interaktif dalam pengajaran dan pembelajaran. Menurut Noor Fadzilah et al., (2017), pelajar telah menunjukkan minat, pemahaman dan motivasi positif dalam proses pembelajaran yang melibatkan bantuan visual. Walau bagaimanapun, terdapat dua masalah utama mengenai sambungan internet dan kapasiti data pelajar yang menyukarkan pelaksanaan pengajaran dan pembelajaran semasa PKP fasa 1 dan 2. Namun, dengan kaedah kreatif, ia membantu mengurangkan masalah dan persiapan dalam menghadapi wabak Covid 19 akhirnya membuka ruang untuk pengajaran alternatif dan ke arah sistem yang lebih fleksibel dan dinamik (Hidayat & Shafie, 2020). Objektif bagi pengajaran low bandwidth adalah seperti berikut:

Melihat sejauhmanakah kemampuan platform media sosial dalam menangani p&p secara konvensional.

Menentukan kesesuaian platform media sosial dalam menangani masalah pelajar ketinggalan 'lost generation'.

Menilai hasil keberkesanan penggunaan p&p menggunakan platform media sosial.

Kelebihan Kepada Pengajaran

Kegunaan platform media sosial dalam menangani masalah pelajar ketinggalan 'lost generation'.

Perkembangan idea baru daripada objek warisan ketara kepada bentuk visual digital dalam subjek Konservasi II (Non-Organik) telah merubah demensi baru dalam penghasilan produk warisan. Sebagai contoh bagi tugasan berterusan, pelajar perlu menghasilkan Coffee Table Book secara digital. Oleh itu pelajar dan pensyarah menggunakan altenatif WhatApps untuk sesi perbincangan dan email untuk penghantaran tugasan. Semasa perbincangan, segala penulisan dapat dibaca semula oleh pelajar yang tidak berpeluang ketika perbincangan berlaku. Ini sekaligus dapat mengelakkan pelajar yang ketinggalan kerana menurut Muh Rais, 2015, pengaruh penggunaan multimedia dalam pembelajaran telah banyak memberikan pengaruh yang positif dalam pembentukan pengetahuan. Hasil tugasan pelajar daripada kursus ini turut memberi banyak manfaat seperti:

1.   Penghasilan Coffee Table Book untuk penerbitan bersama pihak perpustakaan UMK.

2.   Penghasilkan Bab Dalam Buku yang bertajuk Pemuliharaan Rumah Kedai Lama Dalam Pembentukan Imej   Dan Identiti Kota Bharu Sebagai Bandaraya Islam.

3.   Pensyarah juga telah membuat Pembentangan Kertas Kerja Kolokium Antarabangsa Peradaban Wilayah   Timur Laut 2020 yang bertajuk Pengaruh Dan Keunikan Rekabentuk Fasad Rumah Kedai Lama Di Kota   Bharu, Kelantan.

4. Penghasilan prosiding scopus di ICDISST2020 yang bertajuk Potential Impacts in the Conservation of Old   Shophouse towards its Heritage Values.

5. Penghasilkan Jurnal yang bertajuk "Penyenggaraan Rumah Kedai Lama Dan Kesannya Terhadap Nilai   Warisan" yang diterbitkan di International Journal of Creative Future and Heritage (TENIAT), UMK.

6. Pingat Perak Kategori Sains Sosial dalam Carnival Research & Innovation CRI 2019, Karnival Penyelidikan &   Inovasi Universiti Malaysia Kelantan 2019.

7. Pingat Emas dalam e-TeLiC '20, Teaching Enhancement & Learning Innovation Carnival (e-TeLiC) 2020.

8. Pingat Perak Kategori Sains Sosial dalam e-Carnival Research & Innovation e-CRI 2020, Karnival   Penyelidikan & Inovasi Universiti Malaysia Kelantan 2020.

9. Penghasilan jurnal bertajuk Lukisan Mural Sebagai Daya Tarikan Pelancongan Warisan: Kesan Terhadap   Komuniti Setempat Di Kota Bharu, Kelantan (Jurnal Arkeologi Malaysia, Disember 2020, Vol. 33, (Isu   Khas), hlm. 59-66, ISSN 0128-0732 e-ISSN 2590-4302, Diterbitkan oleh Ikatan Ahli Arkeologi Malaysia).

10. Hak Cipta (No Pendaftaran: LY2021W00252) Konsep Rekabentuk Rumah Kedai Berdasarkan Struktur Bangunan Yang Menepati Ciri – Ciri Setempat.

Nilai Komersial

Peningkatan penggunaan literasi komputer seperti e-pembelajaran juga memberi kesan positif kepada pelajar. Menurut Maria Joseph Israel (2015), pelajar yang menggunakan kaedah pembelajaran seperti MOOC dalam pembelajaran tradisional menunjukkan hasil pembelajaran yang positif berbanding dengan pelajar yang belajar bersemuka. Walaupun begitu, menurut Adnans (2020) yang berpendapat bahawa pembelajaran dalam talian terbukti dapat membantu menjaga kesihatan pelajar dan tenaga pengajar dalam pandemik Covid 19. Walau bagaimanapun, ia tidak setanding dengan pembelajaran konvensional. Namun begitu, berdasarkan P&P yang dijalankan dalam subjek Konservasi II (Non-Organik) dengan menggunakan paltform media sosial yang berkapasiti rendah telah membuktikan pencapaian yang memberangsankan oleh pelajar seperti Jadual 1 iaitu Analisis Pencapaian Hasil Pembelajaran yang merangkumi tiga CLO.

Jadual 1: Analisis Pencapaian Hasil Pembelajaran Kursus Konservasi II (Non-Organik).

Course Learning Outcomes (CLO)	Tugasan	Platform Media Sosial	Analisis Pencapaian CLO (%)
Mengenalpasti warisan non-organik secara terperinci.(C4)	Tugasan 1 Kuiz	*WhatsApp*	Pencapaian Pelajar: (28.13 / 40) X 4.0 = 2.8 (Baik)
Merungkai masalah kerosakan artifak dan objek warisan non-organik secara saintifik dan sistematik. (P4)	Tugasan 2 (Coffee Table Book)	*WhatsApp*	Pencapaian Pelajar: (16.88 / 20) X 4.0 = 3.4 (Sangat Baik)

Menerangkan hasil penyelidikan berdasarkan kajian konservasi warisan non organik secara berkumpulan.(A3)	Projek Akhir (Dokumenta ri)	Facebook WhatsApp	Pencapaian Pelajar: (29.75 / 40) X 4.0 = 2.9 (Baik)

Hasil analisis tersebut telah menunjukkan bahawa keputusan yang didapati bagi CLO 1 dan 3 adalah baik dan CLO 2 adalah sangat baik. Hal ini membuktikan bahawa penguasaan elemen-elemen penggunaan media digital dalam kursus Konservasi II (Non-Organik) memberi impak yang baik kepada pelajar dalam memahami kandungan pelajaran. Pembelajaran pada abad ke-21, yang memfokuskan aspek kreativiti dalam pelaksanaan pembelajaran sememangnya sangat terpuji, Bani Hidayat Mohd Shafie (2020). Disamping itu, proses p&p juga telah berlaku secara tidak langsung dan lebih interaktif. Jadi tidak ada alasan yang kukuh sekiranya terdapat pendapat yang menyatakan bahawa P&P secara online menyukarkan proses pemindahan ilmu. Ini kerana pelbagai kaedah dan metod yang sesuai boleh digunakan meskipun pelajar dan pensyarah mempunyai jalur lebar yang berkapasiti rendah.

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EatSAFE StopWASTE: IMPROVING FOOD SAFETY KNOWLEDGE

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Highlights: EatSAFE-StopWASTE© app was developed for the course FSI10803 Food Microbiology and FSI31103 Food Safety and Quality Management. Research based data was used to develop the content of the mobile app which are organized in a simple, clear and straightforward layout to enable majority of the users can understand. The introduction of mobile app into teaching and learning (TL) is to encourage active learning and provide alternative TL medium to the traditional TL process. The EatSAFE-StopWASTE© app not only limited to university students but also aimed to improve the knowledge of general public and food handlers on food safety. Therefore, the mobile app was developed to be an easy to use, attractive, informative and flexible to users. It is hope by improving the food safety knowledge will also help in the betterment of food safety attitude and practices.

Key words: mobile app, food safety, active learning, KAP (Knowledge, Attitude and Practices), students, general public

Introduction

Nowadays, mobile phone referred as "smartphone" offers advanced computing capability and connectivity just like tablet computer. These features reposition mobile phone as a new information medium (May and Hearn, 2005) and there are about 2.32 billions smartphone users around the world (Statista, 2021). Several similar apps relating to Good Manufacturing Practices (GMP), Hazard Analysis Critical Control Point (HACCP), Food Handling, and Calculating Food Wastage are available as separate applications from iOS and Android platform. To the best of our knowledge, no equally identical apps are available in Google Playstore that provide food safety knowledge, estimate food poisoning risk and reduce food wastage through reminder. The aim of this innovation is therefore to describe the new mobile app, EatSAFE StopWASTE 2.0 to help users to improve their food safety knowledge, estimate food poisoning risk dan reduce food wastage.

Content

Description of the innovation

The two main functionality components of EatSAFE StopWASTE app consist of i) reduce food poisoning risk and

ii) reduce food wastage. Food poisoning risk can be reduced through food safety knowledge section which covers, i) common causes of food poisoning, ii) factors affecting microbial growth such as food, acidity, time, temperature, oxygen and moisture abbreviated as "FAT TOM", iii) food utilisation or consumption order using First-In-First-Out (FIFO) or First-Expiry-First-Out (FEFO) principle and iv) 3 rules of Good Food Hygiene Practices. In addition, food poisoning risk estimator section covers four main food categories, namely cereals and grains, fish and meat, fruit and vegetables which will provide users three levels of food poisoning risk (high, medium or low) based on the freshness of food, temperature danger zone and duration of food left at temperature danger zone.

Food wastage can be reduced through StopWASTE section which covers, i) shelf stable food and ii) perishable food. The StopWASTE section reminds users of the foods they buy and thus prevent multiple purchases of the same or similar items. If the foods are shelf stable, the expiry dates will be recorded while perishable foods such as fresh produce the impending spoilage date (three to seven days) was suggested. Table 1 summarized the app functionality.

Background of the innovation

Food poisoning has been a continuous issues in developed and developing countries. One of the reasons is due to lack of food safety and good food hygiene handling knowledge among food handlers and end users. In addition, food wastage due to expired or spoiled products are also on the rise.

Importance to education

EatSAFE StopWASTE app provides users information on the main causes of food poisoning and factors that lead to foodborne diseases. The information provided are easy to understand, straight forward and give key points related to food safety and food handling. The app also provide users knowledge on how to properly store shelf stable food and perishable food.

Table 1. The key functionality components in "EatSAFE StopWASTE" app.

Component	Description
EatSAFE (Reduce food poisoning risk)	Two sub-components were included: Food safety knowledge covers the following aspects: Common causes of food poisoning Factors affecting microbial growth such as Food, Acidity, Time, Temperature, Oxygen and Moisture abbreviated as "FAT TOM" Food utilisation or consumption order using First-In-First-Out (FIFO) or First-Expiry-First-Out (FEFO) principle 3 rules of Good Food Hygiene Practices Food poisoning risk estimator with 3 levels of risks (high, medium and low) covers the following food categories: Cereals and grains Fish and meat Fruits Vegetables
StopWASTE (Reduce food wastage)	Two sub-components were included: Shelf stable food Foods that can be safely stored at room temperature such as canned and bottled foods, rice, pasta, flour, sugar, spices, oils, and foods processed in aseptic or retort packages and other food products that do not require refrigeration until they are opened. Not all canned goods are shelf stable. Some canned foods, such as some canned ham and seafood, are not safe at room temperature. These will be labeled as "Keep Refrigerated." In order to be shelf stable, perishable food must be treated by heat and/or dried to destroy foodborne microorganisms that can cause illness or spoil food. Food can be packaged in sterile, airtight containers. The shelf life of these food are normally identified by expiry date on the packaging. Perishable food Perishable foods include meat, poultry, fish, milk, eggs and many raw fruits and vegetables. It also includes all cooked foods that have to be stored at refrigerator or freezer temperatures. The length of storage time for perishable food in freezer and refrigerator depending on the types of foods ranging from 3 to 7 days in refrigerator and from 2 to 3 months or as per stated on the food packaging in freezer.

Advantages of the innovation/product development/design/process towards education and community.

EatSAFE StopWASTE app uses popular android platform which can be assessed by many users.

With user friendly features and attractive interface helps user to be more engaging with the app.

Commercial value of the innovation/product development/design/process

EatSAFE StopWASTE app can be added into Google Playstore (Android) or App Store (iOS),

food safety awareness program and workshop as well as interactive tool for teaching and learning

in related subjects such as food microbiology and food safety.

Acknowledgement

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AUGMENTED REALITY MODULE FOR PRINCIPLE ACCOUNTING (ABLEH)

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Highlights: A student's achievement essentially in Accounting Principle subject, is frequently associated with visualization process in which learning style of that student needs to be considered to enhance student's visualization skills. Augmented Reality is one of a technology founded able to enhance student visualization skills. Therefore, this study introduces ABLEH module designed for educators and students in which it uses Augmented Reality(AR) technology approach in Accounting Principle subject in order to enhance student's visualization skills.

Key words: Augmented Reality, Module, Education, Principle Accounting

Introduction

In Accounting Principle subject, the comprehension of the principle and concept is crucial especially at the foundation level, due to the fact that shady foundation potentially leads to future learning problem. In solid foundation establishment, teachers role is essential in serving the right approaches and methods to build basic comprehensive scaffolding among the students (Fadzillah & Bahari 2019).

In this subject, visualization skills allow students to imagine the basic concepts and principles of accounting, the complete process of preparing financial statements, financial planning and cost accounting, financial statements, and visualization techniques that transform graphics into data (Tono et al. 2020).

Visualization in education and learning is a thinking skill because it involves a thinking process using images, diagrams, and mental simulations (Gilbert et al. 2008). Augmented reality is seen as an effective learning tool for improving students' visualization skills. Studies have shown that Augmented Reality technology is one of the latest technology identified to help students in improving visualization and learning experience (Yu et al., 2010). AR environment applications are seen to have the potential to bring the learning process out of the classroom and into the space where students live (Dayana et al., 2020). To explore how Augmented Reality Module enhances student visualization skills level for Accounting Principle subject, ABLEH was developed in these studies.

Content

AR can help educators with creative attitudes towards new technologies (Contero et al., 2012; Ivanova, 2011) and stimulating creative thinking (Ivanova &Ivanov, 2011) that allows students to explore new things in interesting ways. It is also seen as a technology that offers certain tools in the process of making teaching content more attractive as well as improving visualization skills (Martín et al., 2013; Alqahtani, et al., 2017).

AR module namely ABLEH was developed by referring ADDIE Instructional Design Model (Rossett, 1987) steps which is comprise with five phases namely as analysis phase, design phase, development phase, implementation phase and evaluation phase.

According to Molenda (2003), ADDIE model was quite simple, easy to understand and systematic which is effective in the development of instructional courses.

Table below show the process in developing ABLEH module

ADDIE MODEL PHASE	
Analysis	Define the problem, identify the source of the problem and target students.
Design	Sketching a story board.
Development	Develop a product based on results from the analysis phase and design phase.
Implementation	Test the product to the target students.
Evaluation	To ensure either the module able to enhance student visualization skills level.

Besides that, ABLEH Module was develop using Edraw Max and PowerPoint applications. The contents of the Module are from the subjects of Form Four Accounting Principles in chapter two titled Account Classification comprising Assets, Expenses, Liabilities, Owner Equity and Revenue. ABLEH is a summary of the initial letters of Assets, Expenses, Liabilities, Owner's Equity and Proceeds. Each topic in module has a specific marker to use in the Augmented Reality environment application. Example as below.

The diagram shows a marker found in the ABLEH Module and a video. The marker used to enable AR application to function. The AR application was developed using unity and vuforia platforms. When the camera is directed to the maker, a video will appear.

The uniqueness of the ABLEH is the module are consisting of combination graphic notes and 3D video which is able to motivate student in learning while comparing with reading the text only. It's can be used by scanning the marker by using android. Besides that, the product is user friendly which can be use anywhere and everywhere as long as they have android without depending on internet line. Therefore, the learning process are more easy and able to enhance student visualization skills. This has been proven through t- tests conducted on this study and the findings

show that the learning approach using the ABLEH Module has a significant and positive impact on the student's visualization skills compared to conventional methods. Hence, increasing student interest in learning and increase student's academic performance in this subject.

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ETHICAL HACKING LEARNING SYSTEM (EHLS)

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Highlights: Ethical Hacking Learning System (EHLS) is a full learning platform which contains all required resources in both aspects, theoretical and practical. It will help students to learn and practice ethical hacking activities in safe and legal environment. It will be designed in a user-friendly way in order to attract users and provide them with a new interesting learning approach in ethical hacking modules. In addition, EHLS helps both students and lecturers to manage and monitor their learning process such as analysing quizzes and performance activities.

Key words: Ethical Hacking, E-learning, Pen Testing.

Introduction

Ethical Hacking Learning System (EHLS) is a new advance platform which provides fresh experience in learning ethical hacking modules for both students and academician. EHLS offers a virtual environment and is equipped with very advance specifications which will provide the higher learning institutions with a platform to observe and to interact with the students, especially in the ongoing coronavirus COVID-19 pandemic. EHLS contains hands on lab terminal, quiz and tracking system. EHLS is planned to be integrated with the university current learning management system (LMS) to import all the registered modules according to intake/semester based. With this integration, all students will automatically registered in the system and the monitoring will begin. This approach is convenient to keep track the progress of each student whether the student is in Malaysia or back in their origin country. In addition, EHLS is equipped with Kali Linux Operating System which helps to provide a safe environment to practice and simulate the attacks and can be used by both students and academician to practice for any cyber security related modules. A simple user manual with guided steps are provided to help in setting up the hacking environment for learning purposes. All the activities mentioned above can be monitored by either admin or lecturers. Points can be set for each task, and notification can be turned on to keep track of the student's performance and achievement. The following is the features provided by the EHLS:

Figure 1: EHLS Features

Context or Background

It is important to have a proper approach when studying or teaching a subject that require practical practices. Major focus applies to sensitive subject such as Ethical Hacking and Penetration Testing which require a combination between practical and theoretical materials without neglecting one of them. Neglecting any of these aspects can cause an imbalance which can result in the failure of achieving students' goal. To this day, security students are struggling to maintain that balance while learning Ethical Hacking, either because of the difficulty in finding resources that consist of both aspects equally, or while they are in the process of learning as there are some lecturers or material has failed delivering the right approach for their particular subject in resulting for student to not gain the output of that subject.

The lack of practical resources makes it hard for student to practice what they learned. It is not easy for students or lecturers to find the right practical task that is suitable to the theoretical materials that they are studying. Either that task is excessively advanced for students current learning process to the point where they lose track of the concerned lesson or the task is only partly relevant to the task.

Furthermore, due to the current pandemic happening in the world, it is hard for students to follow up tutorials and labs probably since no one is allowed to have physical contact with their lecturers. A lot of modules require hand-on exercise, these exercises are challenging for students to follow up with the online system. Hence, students hardly get the concept or the outcomes of that exercise especially with the absence of having physical contact with their lecturers to oversee their progression. In addition, lecturers do struggle too observing and monitoring their students because they don't know if they are following during class or even doing their assessment. As a result of this, this will decrease student's awareness and performance to that particular module.

Rationale

EHLS will help students and improve their learning experience towards ethical hacking. The system will provide students with full and valuable resources for them to learn hacking in both aspects theoretical and practical. Furthermore, it will be a legal environment for students to practice hacking activity in order for them to build their hacking mind set.

Tangible benefits

- Students will have all the resources at one place to learn ethical hacking.
  Easy to track students learning progress and performance.
- Easy to rebuild the virtual system when the system got compromised.
  Easy to manage students access to the materials available in the system.

Intangible benefits

- Satisfaction of students and lecturers with the unique approach of teaching and learning ethical hacking.
- A legal environment for students and lecturers to perform hacking activities.
  Satisfaction of lecturers with the way of monitoring student's performance.

Acknowledgement

I would like to express my special thanks of gratitude to Dr. Julia Juremi as well as Dr. Vinothini A/P Kasinathan who gave me the golden opportunity to do this wonderful project, which also helped me in doing a lot of research and I came to know about so many new things I am really thankful to them.

AUGMENTED REALITY: BASIC REFINERY COURSEWARE IN TRAINING

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Highlights: Augmented Reality (AR) is a technology that mixes 3D virtual reality with image of real environment to the real-time images. The main objective of this paper is to develop the Basic Refinery Courseware for technical employees in the training program to enhance their visualization skills in the crude oil refinery process. This paper describes the practical approach to the development of AR content and the process of developing the courseware known as Basic Refinery Courseware using ADDIE model. The tools used in this development process are SolidWorks, Video Editor, Unity and Vuforia to engage with the AR experiences.

Key words: Augmented Reality; ADDIE Model; Basic Refinery Courseware; Crude Oil Refinery Process.

Introduction

Today, in the dynamic 21st century information landscape, academician and organizations are seeking new and innovative ways to reach users. Augmented reality technology in the industry of oil and gas is a new direction of industry development. Visualization skills is the important element in engineering field these days to guide a good learning method. A high level of visualization skills is essential in the solutioning of engineering issues in this industry. However, several of the employees face the matter in process and understanding the visual information or developing mental images at work. This paper describes the principles used behind the design of the courseware and how it was developed to overcome those issues.

Product Development

A method of Instructional Design model is using the ADDIE model in designing and developing the training courseware with the integration of constructivism learning theory and visualization. The ADDIE model has five stages includes analysis, design, development, implementation and evaluation. In the analysis phase, researcher determined the needs of the technical employees. This includes the objectives and goals to be achieved and accomplished. In the design phase, researcher recognized and create a broad summary or blueprint (Cheung, 2016), which tools should be used and describe a strategy and delivery method to meet the objectives that has been recognized in the analysis phase. While within the development phase, the researcher begins to create the courseware by designing the main point of the elements that's needs to be added into the courseware to fulfil the blueprint created throughout the design phase. In the implementation phase, the finished courseware was delivered to the technical employees to be tested. The last stage of ADDIE model is evaluation, where researcher get feedback relating to the training courseware and to determine if goals are met.

Several approaches are used in the development of interactive AR courseware to enhance the visualization of the employees. Supports from various multimedia tools play a crucial part to be used in the courseware. To create the interactive environment courseware, the researcher added multimedia elements such as videos, animations, audio files, and three-dimensional (3D) virtual environments as the platform to develop the courseware, which transformed the learning content to be additional fascinating, and easier to understand. The integration of 3D objects to the AR technology application also helped to enhance with better visual and sensory experience (Yilmaz et al., 2015).

The contents of the courseware include the refinery process, crude distillation unit and the equipment used in the Crude Oil Processing operation. The aim of the courseware development is as a result of the module experts found that the technical employees have issue in learning these topics particularly the crude oil processing flow at the crude distillation unit and the internal part of the equipment. The trainees were not able to visualize the actual process flow and imagine the exact internal parts of desalter and crude tower, since the exists module uses 2D diagrams in which alternatively can be further improvised using 3D elements and drawing/visual concept for better clarification. Therefore, the courseware development intends to overcome the issues and challenges that happens. Thus, the objective to be achieved by the technical employees after using the courseware were to improve the visualization skills, understand better the basic refinery process and plant operation, and to recognise the component or equipment used in the refinery process.

AR courseware will assist and expedite the employees in the understanding and interpretations of the technical theories, terms, and details, as the employees will be able to visualize the actual equipment and process. The application of AR in the revolution and development of the new way of learning shall provide positive impact to the oil and gas industry since this current technology are less known and considered new.

AR provides advantages to interact with the real world that may create experience that would not be possible to be viewed either in a completely real or virtual world. AR technologies helps users to experience and observed scientific phenomena through manipulated virtual objects that are difficult to observe in the real environment. This can encourage thinking skills and increase conceptual understanding phenomena that are invisible and difficult to see, with the facilitation of AR.

Figure 1 shows the front page and the application of AR using marker-based in the learning and training of the Basic Refinery Courseware.

| Front page of the courseware | The application of AR in the training class |
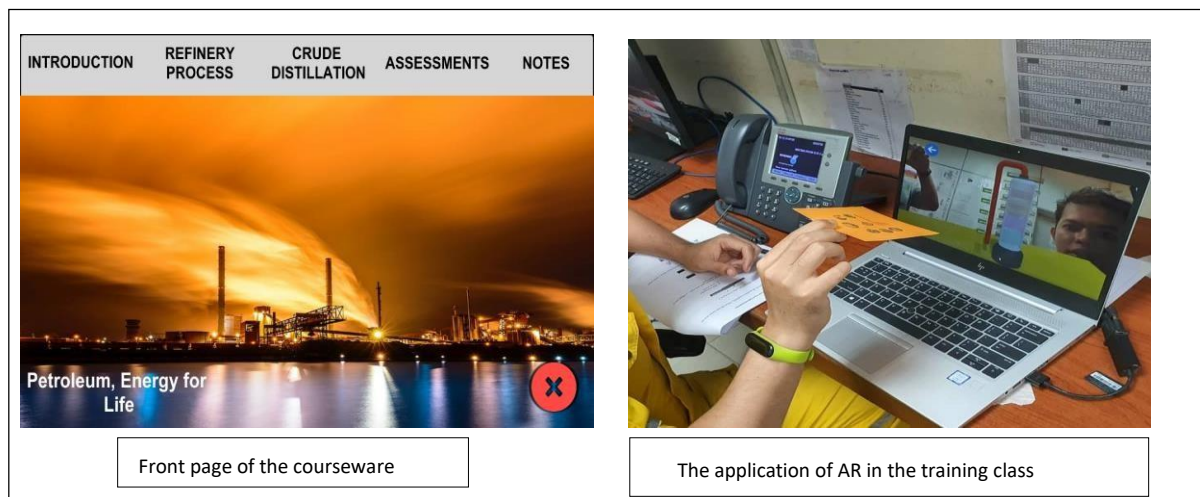
Figure 1: The application of AR in Basic Refinery Courseware.

Usefulness

The newly developed Basic Refinery Courseware using AR technology will be very useful for technical employees working in the Oil & Gas industry, training center, and education institution and to any industry player in the crude oil refining process.

Commercialization Potential

Highly potential to be commercialized among Technical Consultants, Training Providers, and Oil & Gas companies, government agencies specializing in the Energy & Mining Sector and Universities/Polytechnics.

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TEACHING MEDICAL ETHICS DURING COVID-19 PANDEMIC: AN EXPERIENCE USING FLIPPED CLASSROOM AND GAME-BASED LEARNING

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Highlights: Flipped classroom with scenario-based Kahoot quiz during the synchronised online teaching of medical ethics was used on second year medical students. Videos, slides and reading resources were given prior to class. Synchronous online teaching was done using the Cisco Webex platform where the lecturer provided a short summary on the topic based on the materials given for about 15 minutes. The next 15 minutes were used to clarify any queries from students and to confirm understanding. The last half an hour was used for quiz using Kahoot applications as a formative assessment to assess their understanding.

Key words: Flipped classroom, game-based learning, Kahoot, online learning, medical students

Introduction

The COVID-19 pandemic has affected medical training in general. Since face-to-face teaching is reduced due to the risk of infection, many medical schools have replaced the training with an online method. Medical ethics is an essential subject for medical students as it is expected that medical professionals practice ethically up to an acceptable competency.

Description of the innovation / product development / design / process.
Participants

This teaching innovation involved 60 second-year medical students at the Faculty of Medicine, Universiti Sultan Zainal Abidin for the session of 2020/2021.

Teaching delivery
Two medical ethics lectures were done using flipped classroom (FC) followed by Kahoot! quiz during the synchronise online teaching.

Pre-class materials and instructions
Students were provided with teaching materials one week before class. For Lecture 1, students were provided with a 2-minute PowToon video via YouTube, and a 4-minute video lecture uploaded on YouTube. For Lecture 2, students were provided with a Microsoft PowerPoint lecture presentation and additional resources provided in Padlet. Topic learning outcomes were also provided. Students were briefed on the FC method and its expectations. Students were also

informed that a quiz would be given during class using Kahoot! and prize would be given to the winners. Prize were prepared to encourage their enthusiasm for learning.

In-class activities

During synchronous online teaching, the lecturer provided a short summary on the topic followed by question and answer session with the students. It was followed by Kahoot! quiz based on either real scenarios or created scenarios of medical ethics. Students were tested mainly on their decision-making skills based on their understanding. After each scenario, the lecturer discussed and justified the answer. At the end of the Kahoot! session, winners of the quiz were announced.

Post-class feedback

Feedback was done using an online Google Forms. Students rated the questions in 5 Likert scales from 'Strongly disagree' (1 point) to 'Strongly agree' (5 points). The questions include their perception on FC (providing materials to students before class), scenario-based quiz, Kahoot! use, whether they prefer a traditional lecture and whether they have achieved the learning outcomes. Subjective feedback was also requested (optional).

When COVID-19 pandemic affected the education system, teachers around the world have started to come up with many ideas on how to teach their students online. One of the challenges of online learning is how to keep students' focus during class and maintaining their enthusiasm and motivation. Online learning also reduces student-teacher interaction. Teaching methods used must take into account of all these challenges. Providing teaching materials prior to class would increase students' motivation to learn. Kahoot! use improve students' attention, participation and engagement in class.

The advantage of a FC is it can save time on face-to-face teaching, encourage student-centred learning, a more flexible learning time, deeper learning and more quality learning time where the focus is on clarification and understanding of more difficult topics (1). Quiz-based features such as Kahoot! can be used for learning and assessment tools. Quiz-based features have been shown to increase student engagement, concentration, enjoyment, motivation to learn and the overall quality of teaching and learning (2, 3, 4).

The tools used in this teaching method is readily available for use. The free version of PowToon video and Kahoot! is already sufficient to make teaching possible. The paid version may have extra advantages. There are also many free software/programme that can be used to create a video lecture. In this project, Windows Movie Maker was used. Learning on how to use these tools is also readily available in YouTube. YouTube is also free to upload the videos and easily accessible to students anytime.

Since this project is using the readily available programme/software/applications, it does not add in any commercial value. However, it can be easily replicable by any lecturers in any area of speciality or institution in the world as long as they have an internet access.

Feedback results

Table 1. Response of students for Lecture 1 and Lecture 2

Item	Lecture 1 n(%)						Lecture 2 n(%)					
	Strongly agree (5)	Agree (4)	Unsure (3)	Disagree (2)	Strongly disagree (1)	Mean	Strongly agree (5)	Agree (4)	Unsure (3)	Disagree (2)	Strongly disagree (1)	Mean
The materials prior to class help me understand the topic	39(79.6)	10(20.4)	0	0	0	4.8	46(76.7)	14(23.3)	0	0	0	4.8
The discussion based on the scenario help me understand the topic	35(71.4)	14(28.6)	0	0	0	4.7	46(76.7)	12(20.0)	2(3.3)	0	0	4.7
I like the use of Kahoot! game in class	35(71.4)	14(28.6)	0	0	0	4.7	35(58.3)	24(40.0)	1(1.7)	0	0	4.7
In general, I am able to achieve the learning outcomes using this teaching method	29(59.2)	20(40.8)	0	0	0	4.6	35(58.3)	24(40.0)	1(1.7)	0	0	4.7

Subjective feedback from the students	Pre-class material	Giving slides earlier actually helps me a lot during the class because I can revise first.
		Even during the quick revision, I did not understand much, but at least I am familiar with the word and quick to catch up.
		Prior materials helped students to have a rough idea of what to be discussed in the class.
		It is easier for me to understand in class as I had already read the materials given before class.
		I highly agree with it as students can take a look at what they will learn before the actual session takes place.
	Scenario-based quiz	I really love how the class was handled (the Kahoot and scenario-based cases). Because, even though we learn the theory, the application in our real-life situation is quite complicated and confusing. But, when it was put in scenarios, it helped us a lot in understanding what we read in the lecture slides.
		For scenario-based quiz and discussion, I found it very interesting and easy to understand as well as be able to correlate with the situation. It helped students understand more rather than just reading fact points in the lecture notes.
		The scenario-based quiz helped students to understand the topic better because it was testing the application of the theoretical concept that the students were taught.
		The discussion after each question was very helpful.
	Conduct of the class	Good session, active discussion.
		I feel like it's a fun and effective way to learn the topics because it's like active learning.
		The class was engaging. Conducting the class via Kahoot quiz was fun and energizing us to participate in the class.
		The Kahoot session was extremely nice, and very helpful to understand.
		I got the urge to prepare before join the Kahoot. After each question, lecturer explained first before proceeding which helped to understand more.
	Internet connection	Internet connection was a problem which leads students not being able to participate fully in the Kahoot quiz.
		It was quite difficult to interact online especially when the internet connection was poor.
		My connection sometimes are not stable
	Time	The drawback is, the quiz was time-consuming especially when the time allocated for each question was too long. The lecturer should have a better estimation of the time needed for each question.
		It takes too much time sometimes and some of us have problems with their internet connections so they can't enjoy it much.

Project link
https://www.youtube.com/watch?v=ZfEW07y4_tE
https://www.youtube.com/watch?v=LThYwZYZybM
https://padlet.com/norwatidaud/t17f51nkb13w

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TEACHING AND LEARNING OF RESEARCH METHOD THE FUN WAY BY USING #HASHTAGS IN FACEBOOK

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Highlights: Seminar on Landscape Architecture Research (LAN3903) is a course offered at the Faculty of Design and Architecture in Universiti Putra Malaysia (UPM) particularly for the year three Landscape Architecture students. This course was designed to provide the students with an introduction to research methods and to produce an appreciation of the research process. In order to arouse students' interest in research, #hashtag sharing, as an atypical individual assignment was introduced in this course. This innovative way of teaching enhances the student's ability to read research papers, discuss about research methods, disseminate research findings, and connecting with audiences outside the context of traditional classroom.

Key words: Facebook; hashtag; method; learning innovation; Student centered learning (SCL)

Introduction

Seminar on Landscape Architecture Research (LAN3903) is a course offered at the Faculty of Design and Architecture in Universiti Putra Malaysia (UPM) particularly for the year three Landscape Architecture students. This course was designed to provide the students with an introduction to research methods and to produce an appreciation of the research process. To arouse students' interest in research, #hashtag sharing, as an atypical individual assignment was introduced in this course. This innovative way of teaching enhances the students' ability to read research papers, discuss about research methods, disseminate research findings, and connecting with audiences outside the context of traditional classroom. About 41 students were invited to pick three research articles that they find important and interesting from reputable journals and then to share a summary or commentary (using not only plain text, but also image or video) via Facebook. By using the same #hashtag (i.e. #LAN3903), students and their peers can respond to the posts and discuss with each other immediately and transparently via the social media platform. Towards the end of the semester, the lecturers received positive feedback from the students e.g. Some students say that now there are more aware of what a journal is and how to find it for their future projects or assignments. Another student shared his view by saying it also save time because by using hashtags we can gather many journal articles from the other classmates on the same issue.

#Hashtag is a free-of-charge and easy-to-use online tool in many social media platforms. It provides a timesaving and hassle-free option especially for faculties who might have little frustration in encouraging students to read and talk about research papers. For both lecturers and students, no prior knowledge of IT is required, and this option can be applied directly in any disciplines. Students are able to experience the essence of knowledge building and sharing not only among classmates but some of their; real friends' as well. They have to "digest" and "share" in a user-friendly way, after reading some journals papers that they believe their friends might also be interested in.

In a course (LAN3903 Research Method for Landscape Architecture) that designed to provide students with an introduction to research methods and to produce an appreciation of the research process, using #hashtags sharing, as an atypical individual assignment, aimed to arouse students' interest in the social media platform. Students will be invited to pick three research articles that they found important and interesting from reputable journals and then share a very summary or commentary via facebook. By using the same hashtag #LAN3903 students and their critical friend's respond to the posts and discuss with each other immediately and transparently via the social media platform.

This kind of teaching and learning using #hashtags can be applied to other disciplines too. Using #hashtags in classes increases the interest and students, involvement in the class. This makes the teaching and learning process interesting.

Figure 1: Feedbacks from the students

Table 1: Awards won for this innovation by the author.

Awards	Event	Title	Organisation Awarded	Year
GOLD AWARD	e-SEMINAR PENYELIDIKAN & INOVASI DALAM PENDIDIKAN (e-SPeDIP2020)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	INSTITUT PENDIDIKAN GURU KAMPUS SARAWAK	2020
BRONZE AWARD	INTERNATIONAL INVENTION INNOVATION & DESIGN COMPETITION 2020 (3iDC)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	UiTM Kedah	2020
SILVER AWARD	PUTRA INNOCREATIVE CARNIVAL IN TEACHING & LEARNING (PicTL2019)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	UPM	2019
SILVER AWARD	INTERNATIONAL LEARNING	Using #Hashtags in Facebook to	UUM	2019

	INNOVATION COMPETITION (PIP 2019)	Facilitate Teaching & Learning of Research Methods		
BRONZE AWARD	8TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION (iNDES 2019)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	UiTM Perak	2019
BRONZE AWARD	I-InTeL2019 (INTERNATIONAL INNOVATION IN TEACHING & LEARNING 2019)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	UiTM Kedah	2019
SILVER AWARD	INTERNATIONAL LEARNING INNOVATION COMPETITION (PIP 2019)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	UUM	2019

Acknowledgement

COLLABORATIVE CREATIVITY THROUGH GAME DESIGN: GAMIFICATION AS AN INNOVATIVE PEDAGOGICAL APPROACH FOR TEACHING LEARNING DISABILITIES

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Highlights: As part of a gamified undergraduate course on Introduction to Learning Disabilities, 6 groups of students engaged collaboratively in game design and game development to creatively develop non- digital games that were meant to enable them to enhance their 21st century skills: creative thinking, critical thinking, collaboration, and communication. Each game design and development per group, which also served as an alternative assessment of the course, was then showcased during the Game Play Day for other groups to learn about the concepts on learning disabilities in a playful, engaged, and fun manner.

Key words: collaborative creativity, game design, creativity, gamification, learning disabilities, 21st-century learning

Introduction

The recent reform of our education system has resulted in the emphasis on future aware, future ready graduates. Thus, universities have a major role to play in using innovative strategies to prepare the young for the future. In line with these 21st-century educational concerns and the shift into an innovation economy, academics in higher education are expected to reconceptualise and implement innovative pedagogical teaching-learning approaches to prepare university students for the future of work (Baruah & Paulus, 2019). One promising educational approach is gamification, which uses design elements with game characteristics in non-game contexts (Deterding et al., 2011).

Despite the importance of 21st-century learning skills, collaborative creativity is an understudied aspect in higher education. To address this concern, the present study elicited the self-evaluations of undergraduate students regarding their collaborative creativity experiences during their game design project situated within the university course on learning disabilities. A descriptive, mixed-method case study model was used in this study. A total of 14 undergraduate students, with a mean age of 22 years, volunteered for the study. An adapted version of the Assessment Scale of Creative Collaboration (ASCC) questionnaire was used to determine the students' collaborative creativity during game design. Likert-scale data obtained from the participants' questionnaires were analysed using descriptive analyses. Open-ended questions were analysed qualitatively using thematic analysis. The results revealed that the students valued the diversity of knowledge and skills of their team members, shared different ideas, adapted their ideas and practices according to the project difficulties. Majority of the participants trusted their team members, co-constructed the game together, overcame conflicts in positive ways, developed multiple versions of their game, and coordinated well for their team project.

Content

A total of six non-digital games were designed and developed by undergraduate students (see Table 1 and Figure 1).

Universities have a major role to play in using innovative strategies to prepare the students for the future. As a comprehensive university, there are many courses offered by the various faculties at Universiti Malaysia Sarawak (UNIMAS). The Introduction to Learning Disabilities course is offered by the Faculty of Medical and Health Sciences as an elective course and taught by experts from cross disciplinary areas. The present study, which focused on the collaborative creativity of undergraduate students during game design, is part of a larger Scholarship of Teaching and Learning (SoTL) project, which investigated how the use of an innovative gamification approach could enhance the knowledge, engagement, cognitive load, and collaborative creativity of the undergraduate students.

Engaging in collaborative creativity during the process of game design is important for enhancing 21st century skills such as creativity, critical thinking, collaboration, and communication among university students. This gamification approach fosters active learning such as engagement and autonomy. Courses such as learning disabilities can be taught using innovative pedagogical approaches rather than traditional didactic approaches. University students who are exposed to co-creation opportunities in game design are trained for the future of work.

The games that have been designed carries multiple advantages to various groups of individuals. The lecturers themselves benefit by shifting their roles from that of the teacher to the facilitator; the students learn to collaborate creatively to design and develop games revolving around the topic on learning disabilities; and the students who play the games on learning disabilities have opportunities to learn in an active and engaged manner while playing games. Enhancing the knowledge of university students about learning disabilities is important for realizing the nation's and community's desire for a more inclusive environment where all individuals have equal rights and access to education and participation in the community. The innovative gamified course contributes towards UNESCO's SDGs number 4 (quality education).

The games have commercial value in terms of marketability where the games can be further prototyped for mass production and sold in bookstores. The games may also undergo scaling up into digital games (e.g., mobile applications) to enhance the general knowledge regarding learning disabilities among the general public, doctors, nurses, social workers, parents, and university students.

Table 1: Game designs and development by undergraduate students.

Group name	Name of game	Type of game	Content
PDK Suria	SigSynium	board game	sign and symptoms of learning disabilities
PDK Sentuhan Kasih	Cluetopia	jigsaw puzzle, crossword and maze	cerebral palsy
CBR	Law Jenga	jenga game	laws and acts that are available for person with disabilities (pwd)
Perkata	Man vs Pirate	treasure hunt	down syndrome, dyslexia, autism, cerebral palsy
Dyslexia Association of Sarawak	Finggo-5 & Treasure Hunt	board game	word decoding, sight word reading
Kuching Autistic Association	Escape Room	escape room	autism

Figure 1: Undergraduate students during Game Play Day.

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INTERACTIVE APPROACH USING E-CAMPUS FOR SUSTAINABLE SCIENCE COURSES

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Highlights: This article highlights on the interactive approached used in learning Sustainable Science courses. The interactive approach using UMK LMS or known as e-Campus as an e-learning platform gives a fresh and different style of learning process for students through participating in created activities such as educational games, animation videos, online classes and many more.

Key words: interactive, e-Campus, e-learning, educational games, animation videos.

Introduction

In this millennium years technology has become a very crucial part of our daily life. The use of technology is not only for entertainment and communication, it is also has become one of the important platforms in teaching and learning. Nowadays, e-learning has become an important part of the education system and has changed the view of teaching and learning process as a whole. Advancement in internet and multimedia technology is the basic enable for e-learning.

E-learning is the process of extending learning or delivering instructional resource sharing opportunities, to locations away from a classroom, building or site, to another classroom, building or site by using video, audio, computer, multimedia communications, or some combination of these with other traditional delivery methods (Wani, H. 2013). There are diverse ways of classifying the types of e-learning. Algahtani (2011) divided e-learning into two basic types, consisting of computer-based and the internet-based e-learning. There are many e-learning platforms now in the market. In UMK, we are using L e-Campus as an e-learning platform to enhance students' better understanding in an interactive approach.

Content

In Sustainable Science Courses, student will be introduced with environmental concepts in via conventional and online lectures. Apart from that, lab conducts are taught for in order to give skills and experience for students in the field. In this e-learning platform, these courses are divided into 3 parts consisting of course content using animation videos and online classes, 2) knowledge and information for the course content including some extra reading notes and 3) activities including interactive discussion, projects and quiz.

As an introduction for the course, a short animation of audio -visual is created to build an excitement among students and increase their engagement. It promotes a better understanding in a fun way and encourages students to learn more about the course. In the knowledge and information parts, notes are given related to learning topics for their fully understanding and self -exploration of related topics.

Activities such as interactive discussion through padlet platform give real time interaction between students and instructor. Students are given task in terms of projects in the field and required to report their progress through this platform.

Quiz is also created as one of the activities that will help to evaluate the students' understanding on the topics in the courses. Besides that, quiz is also used in this course as one of the educational games and activities to help students learn and understand topics related to law and regulations. This kind of educational games will assist the students to have better understanding and familiar with the law and regulations related with the course learned. Figure 1 shows the interactive approach used in teaching sustainable science course by utilizing the e- campus platform.
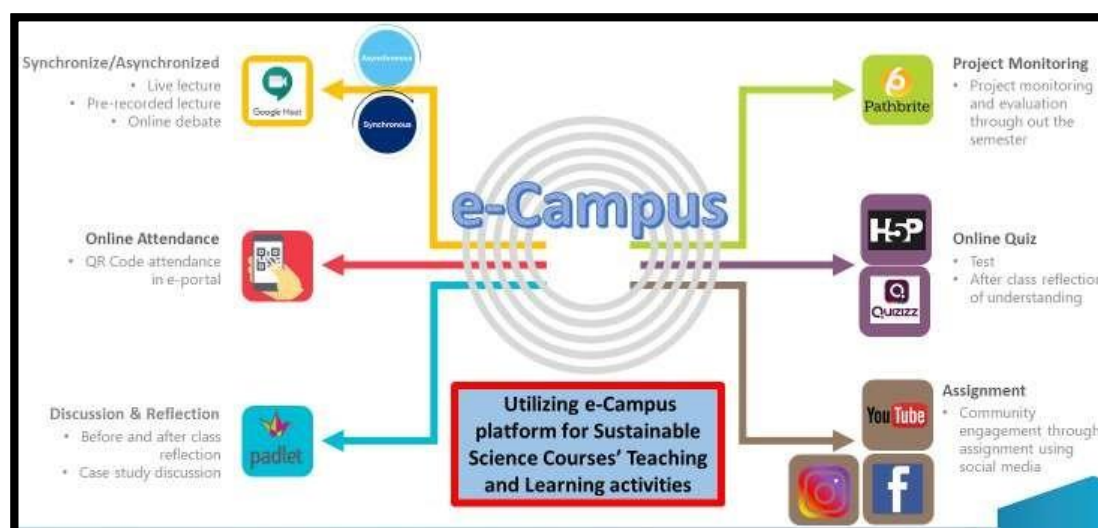
Figure 1: Utilizing e-campus platform for Sustainable Science Courses' Teaching and Learning activities

The importance and advantages

Based on the conservative methods applied in Sustainable Science courses conventional lectures, learners had difficulty in visualizing and applying knowledge practically. Hence, in order to sustain the learning process of this course some enhancement is required. In this paper, it is proposed to incorporate virtual objects when blended with real world. It is aimed to amalgamate entertainment and study by providing immersive learning experience to learners. The expectation with this enhancement is to impart a great deal of knowledge and better learning outcomes for Sustainable Science Courses. Through this e-Campus platform, students will have experience to explore and discover virtually the contents of the courses via many e-learning media such as you-tubes and online documentary in their own spaces. The better visualization of the content keeps learners active during the learning process as it enhances human ability to understand and process information (Serio et.al. 2013).

Fully utilizing all e-learning tools in e-Campus platform had proved to enhance student understanding by comparing the results for two consecutive semesters. It is proved that the total numbers of student score A in the subjects are increasing as shown in Figure 2.

Figure2: Difference between students' result in two difference semesters

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PLAY AND CHANGE: MEANINGFUL ENGLISH LANGUAGE LEARNING THROUGH IFAMRES MINECRAFT

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Highlights: : IFAMRES Minecraft is a framework that incorporates environmental problem-based learning (PBL) and digital games to facilitate real, interdisciplinary, and practical English language learning. It consists of eight lesson plans incorporating various Microsoft tools and Minecraft in addressing real-world issues. The outcome of this project is twofolds. First students will have a new and stimulating way of learning English language, and second, students will become the agent of changes that will reach the society. Therefore, this framework represents the combination of the imagination of the students, self-determined learning and collaboration in addressing the real-world problem that eventually will help the society.

Key words: Minecraft, Environmental Problem-based learning method, SLA, e-learning

Introduction

English language learning should be made meaningful which allow students to have a valuable experience beyond the classroom. This can be achieved by using teaching method that provide students with real-world problems such as environmental issues. Abdullah et al. (2018) claimed that environmental education is embedded with environmental knowledge, proficiency, skills, and nurturing positive values and attitudes. By referring to this, English language learning would become more meaningful if environmental education is integrated into language learning.

Further, the integration of various computer technologies and software, gadgets and online tools in teaching and learning has changed the current educational landscape. One of the most apparent changes is the use of digital games as learning method. Digital games that are normally considered as a form of entertainment have been proposed as one of the effective tools if they were combined with education to promote student engagement and joyful learning process (Prensky, 2003).

Background of the innovation

This innovation was undertaken with the premise to make English language learning to be more meaningful. In relation to this, a few topics in English language syllabus are related to the environmental issues. Thus, environmental education is befitting to be used in the lessons. Environmental problem-based learning is a method that provides students to learn cooperatively to find solutions to any problems. Kokotsaki (2016) mentioned that PBL is a successful way of developing creativity and positive environments for learners. Studies on PBL has shown that the use of PBL is advantageous in English language learning. Essien (2018) found that the use of PBL improved ESL learners' speaking skills, while Dyah Christina Iswandari et al., (2017) found that the use of environmental PBL in language teaching was effective on learners' writing skills. These suggest the effectiveness of PBL in English language learning.

In addition, since the use of digital games in education has become popular, it is becoming more critical to find ways to integrate digital games into English language learning. According to Rasti-Behbahani (2021), digital games can create an authentic context for learning through their virtual worlds in which learning happens in a real-life-like context. Combining pictures, audios, videos, and graphics, a virtual

world can generate a rich context for the gamer to learn almost any subject and skill. In this sense, Minecraft has been chosen to be used in the framework as students can create their own 3D world and storyline, and it can be played with multiple players which promotes collaborative work. A few researchers have found the positive impact of using Minecraft in language learning.

Hausrath (2012, p.5) found the use of Minecraft improved his students' communicative ability. Another study on Minecraft was conducted by Uusi-mäkelä (2015) who found that his students were excited to write in English while using Minecraft.

Therefore, given the popularity of digital games in English language learning and the importance of meaningful topics in English language lessons, we have created the IFAMRES Minecraft that focuses on environmental problem- based English language learning

Description of the innovation

IFAMRES Minecraft is a framework that combines both environmental problem-based learning and digital game. It consists of eight lesson plans that combine various Microsoft tools and online tools. IFAMRES is an acronym made up of the processes involved in the students' English language learning as can be seen in Figure 1.

Figure 1: Processes in IFAMRES Minecraft

Characteristics of the innovation

Knowledge construction
Problem Solving
The use of ICT for learning
Integration of digital game
Collaboration
Reaching Community

Importance to education and community

In this framework, students are given the autonomy in their learning. They will search information related to environmental issue and find solutions to the problems on their own with little intervention from the language instructors. The framework allows students to connect and utilize the language effectively. The framework covers all skills related to English language learning in a fun way as they learn through digital games and this can respond to the boring English lessons that only consists of grammar drills. IFAMRES Minecraft also shows that English language learning can cross all disciplines, and this make the learning more meaningful. Thus, this framework is befitting the 21st century learning design which combines information and communication skills, problem-solving skills

and self-directional skills.

Additionally, the students will realize that they are able to contribute to the society using the knowledge that they have learned. The students will become the agent of changes that can reach the society to offer solutions to the environmental issues. Not only that, they can break the stereotype that digital games is not beneficial for learning and society. This shows that the use of digital games in English language learning can be a stepping stone to break the gap between the community and academic. All these will be making the learning more meaningful and valuable.

Commercial value

IFAMRES Minecraft has major commercial opportunities in Malaysia and overseas. Since it is an educational framework, it can be commercialized to all educational institutions locally and internationally. It is also profitable as the inventors will charge for any IFAMRES Minecraft training. Lastly, a handbook on this framework will be produced and it will also be sold through publishers.

In conclusion, English language learning should provide students with the opportunity to learn beyond their English language classroom. The learning should not only about stimulating the thinking process of students, but also making it meaningful to the students by reaching and changing the society.

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FUTURE READY ACCOUNTING COURSE AND E-LEARNING IN HIGHER EDUCATION: INTEGRATION OF SIMPLE AUGMENTED REALITY TOOLS

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Highlights: This project is to develop a future ready accounting curriculum that equipped with innovative, interactive and more engaging approach for non-accounting students. The project utilises contemporary technology such as augmented reality technology and internet of things in the teaching and learning process which known as blended learning.

Key words: e-Learning, Future Ready Accounting Curriculum, Augmented Reality, Blended Learning, society 5.0

Introduction

An accounting course is undeniably no longer limited to only accounting students (Roska et al., 2018). This is chiefly because accounting is not a narrow discipline. In other words, the accounting discipline encompasses knowledge beyond the traditional understanding of bookkeeping, debits, and credits. In fact, the accounting field covers wide areas of knowledge that non-accounting students must be equipped with, such as corporate governance (see Nasir, Ali and Ahmed, 2019), earning management (see Nasir et al., 2019), risk management (see Zainuddin et al., 2021; Zainuddin et al., 2020). All of these knowledge is ultimately useful for graduates when entering and competing in the employment market. Students equipped with accounting knowledge and skills will find it easier to be employed in comparison to those without (Roska et al., 2018 and, Maali and Al-Attar, 2020). In essence, an accounting course today has become a compulsory or a pre-requisite course for non-accounting students before they are allowed to take advanced courses, depending on their undergraduate program's specialties or majors. These non-accounting students mostly come from the business, management, and entrepreneurship programmes (Allif et al., 2019). These students must therefore grasp the basic functions of accounting knowledge and skills, valuable in helping them manage the financial and non-financial aspects of a business. However, it is noted that some of them have found it difficult to learn accounting (Allif et al., 2019). There are many explanations for that, with one outstanding explanation being that the traditional accounting course is 'old fashioned', less attractive, and less engaging for students. Besides, the advent of the Industrial Revolution (IR) 4.0 suggests that technology is ultimately an indispensable tool in optimizing outputs, in this case, increasing the innovations and attractiveness of a conventional accounting course. In other words, it is necessary for accounting courses to be embedded with the latest innovations and technologies in order to cover existing loopholes and make the courses more attractive for non-accounting students (Allif et al., 2019; Andiola et al., 2020). The study hence aims to develop a future-ready curriculum, in particular, focusing on an accounting course for non-accounting students.

In addition, this project examines the non-accounting students' experiences of applying FRAC in their accounting courses. Simeon (1999, 2001) modified the adopted AIPD framework to produce an innovative and attractive accounting course for students. With respect to its methodology, this study

adopted a mixed method approach. On top of that, questionnaire surveys and descriptive analysis were also used to examine the students' experiences towards FRAC. Since the lecturer teaching FRAC composed one member of the research team, a field observation was also carried out to monitor the FRAC's implementation.

The results of the study reveal an evidence that an accounting course can indeed be taught in more innovative and attractive ways. In other words, accounting departments would do well to consider the novel contribution made by this project by adopting FRAC to replace the old-fashioned conventional accounting courses. It is noted that the non-accounting students employed in this study were able to feel a new experience in learning an accounting course with the adoption of FRAC. To lecturer, this FRA course is a sophisticated teaching method to deliver Accounting course to Gen Alpha students. This will be the most efficient and effective teaching and learning alternative to expose Gen Alpha students with sufficient set of skills along to the disciplinary knowledge in social science. To university, FRA course will become a set of example to its faculties in conducting university's regular Curriculum Review (CR) procedures which become a requirement sets by Malaysian Qualifications Agency (MQA) and the university Centre of Academic Excellence and Development (CAED). By having a ready FRC, the CR procedures can be more attainable, efficient and effective. To the Ministry of Education and Higher Education, FRA course can become one of a best practice or guideline that can be recommended to educational institutions in building new curriculum and transforming existing traditional curriculum based on industry demand and rapid technology development era. This is aligned with the current ministry aspiration on improving existing educational system to adapt competitive demand from IR 4.0 challenges. This project can be commercialising to public and private educational institutions who offer accounting course.

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GETTING PRELOVED BOOKS MOBILE APPLICATION: "GET YOUR BOOKS"

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Highlights: Students are people who have limited in term of finances. Every semester begins, new subjects are offered by the program and require students to get a reference book for their study. With having financial constraint, students are not afforded to buy new books as its pricey and sometimes the resource at the library is limited. To cater to this problem, the 'Get Your Books' mobile application is developed to help students to get the preloved books at an affordable price. We believe this platform has not benefited the students themselves but also the environment as well. We are helping the environment by recycling the old books and help the students (seller) to get their money back even it is not much as they paid when they first bought the books.

Keywords: *preloved book, student application, mobile application, eCommerce platform*

Introduction

This innovation project is a solution to the current issue in accessing the preloved books. This project is also believed to have an impact on society as well. We developed a mobile application and name it 'Get Your Books' that can provide hundreds of books for sale at low prices to students. It not only selling used books but also a platform where students can get an additional income. Nevertheless, this platform can also facilitate students with new norms due to hard in finding the reading materials. For example, during MCO, public libraries and bookstores are closed for a long time, which must limit the movement of students to seek references in places such as libraries and other bookstores. Thus, this platform can access the students will only need internet data to browse this website without any obstacles.

Through this platform, we will provide various types of used books and sold at affordable prices. This will cause students to be able to buy quality books without incurring high costs. For example, the price of new books is around RM 20 to RM100 plus, but through this platform, we will get preloved books that are suitable for the learning edition and they do not have to buy at the original price and automatically they will be able to save more money.

Furthermore, we emphasize that there is no poverty as a goal of sustainable development. This will be done in helping students financially. 'Get your books' mobile application help students by buying

books at reasonable prices even though the book is a used one, but it is still good in quality. On top of that, students can also generate income by selling their used books that are no longer in use. Indirectly it will help students to get their money back even it is not much as they paid when they first bought the books.

The importance and advantage of the "Get Your Books" apps to teaching and learning

Our target customers are students in institutions of higher education

Our products sold at reasonable price and help the customers especially the students to find notebooks and reference books at lower prices.
We help the customers to sell old books that they no longer want to use.

We want to help the students to generate income by selling their books.

We also provide services to advertise used books on our website.

Our business can save the environment from waste of used book.

Our business is also able to reduce used books from being damaged and wasted everywhere.

Commercial value in terms of marketability or profitability of "Get Your Books" apps

This apps is believed to provide commercial value in term of marketing by targeting the students in higher education institution. Many students are looking for a reference book with cheaper price so this is a solution for them.
In term of profitability, we use sales revenue model by charging 5% for each of the sold books. We also use advertisement revenue model for those who wants us to promote more about their books. By having these two revenue models, it will helps us in generate more profits.

Acknowledgement

ENHANCING INTEREST FORMATION IN ENGLISH THROUGH XploreRAFE+: AN AR-BASED GAMIFIED MOBILE APPLICATION

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Highlights: This study proposes a mobile gamified augmented reality system named XploreRAFE+ which its design was foregrounded by the Interest-Driven Creator theory, aimed at triggering, immersing and extending learner's interest in learning particular subjects. This application is customizable in nature, as such, it has pre-designed the pedagogical and technological aspects, whilst the content aspects need to be plugged-in by the users according to the subject matter. In this study, the app was currently designed and used to support the learning of English among college students in China and the findings showed that students' interest was cultivated through a dynamic loop.

Key words: Mobile augmented reality, gamification, cloud computing technology, English learning, interest formation, interest-driven creator theory

Introduction

In the Fourth Industrial Revolution, AR technology that is regarded as an emerging technology has shown significant advantages in enhancing students' learning interest (Wang, 2017). AR technology refers to presenting the real world, with virtual objects superimposed upon or composited with the real world (Azuma, 1997). AR technology can attract students to interact with the real environment, which was before considered as an impossible learning approach (Billinghurst, 2002). Besides, in higher education, gamification techniques are commonly used to increase learners' motivation and engagement in a learning task and the most commonly utilized techniques are points, badges, levels and leader boards (Alomari, Ai-Samarraie & Yousef, 2019). AR technology can effectively combine the form of gamification in learning (Bicen & Bal, 2016).

Content

The XploreRAFE+, using Ali elastic compute service and object storage service, was developed by the researchers using unity 3D software. The system provides an AR map for students to find the trigger images, which were located at different locations for students to learn English in a real environment. At each location, learners are able to activate the AR images and videos to understand the situation at each scene, and perform some tasks that could stimulate their learning of English language including writing, speaking, reading and listening skills. Besides, a leader board was incorporated to create

competitiveness among learners to solve their tasks at each location accurately and quickly and the data were stored using a cloud computing technology.

With regard to key innovative features and characteristics, the app is customizable and instructors can create their own courses, combining their own real campus environment and even off-campus locations to meet their teaching requirements. Meanwhile, instructors also can choose any kinds of 3D materials and multimedia teaching materials such as videos, audios and images to present their learning contents, providing more rich forms of explanation and imparting knowledge according to their teaching needs. Besides, the app can gamify the whole learning process after instructors customize their learning locations, contents and forms of presentation. At the same time, with the support of AR technology, augmented reality elements that overlay (3D objects, images, videos) will appear and superimpose on real scenes. Therefore, the course is customizable and can be flexibly designed to be a gamified AR learning process and the learning process can immerse students in a real scene to learn new knowledge through diverse presentation forms. Furthermore, because of the customizable feature, the app can be used across different subjects, topics, different levels of education. In additional to innovative features of pedagogy part, the app also has excellent technical innovative features. The app, combining gamification elements, is not only supported by AR technology but also underpinned by cloud computing technology which has huge advantages for mobile learning, which provides solid technical support for creating diverse gamified AR courses. Because of these characteristics, in its application in English teaching, it enables teachers to combine their teaching content with the real living environment and teachers can present the English content in a diversified way and provide more vivid and practical English courses. Meanwhile, the gamification process makes the English course more interesting. The app provides a new way to design courses, which reforms the traditional teaching approach. Also, the app provides a platform for teachers to reform the traditional teaching form and facilitates them to apply emerging technologies in teaching. As for future potentials, with the increasing application in different disciplines, the app's teaching materials such as videos, 3D and images can construct a teaching database, which can reuse and create more new gamified AR courses.

In this study, a case study was conducted among 38 vocational college students for 4 weeks in a teaching unit themed "daily life" which was aimed to review English grammar, learn new English language sentence expressions in different scenes and practice listening, speaking, reading and writing skills. Meanwhile, interviews, observations and document analysis were implemented to understand how this app can enhance interest formation in learning English. The data were analyzed using a constant comparative technique advocated by the grounded theory approach. The findings of the study showed that students' interest was formed through a dynamic loop including piquing curiosity, experiencing flow and perceiving meaningfulness in the gamified augmented reality environment. Also, it revealed that the formation of interest was accompanied by the continuous improvement of ability, confidence, initiative and relatedness of the students.

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HYBRIDIZATION OF GAMIFICATION WITH PROBLEM-BASED LEARNING (PBL) IN VETERINARY COURSES

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Highlights: Problem-Based Learning (PBL) encourages peer groups to investigate on practical issues by active discussion. Enhancement on the learning experience by hybridizing PBL with gamification with hope to engage students, promote learning, and solve problems. This gamified-PBL serves for two purposes; i) student-centered learning using low-bandwidth chat group and ii) self-pace learning. Group of 2nd year Veterinary Medicine students were subjected to classical PBL session and gamified-PBL session. Overall gamified-PBL achieved the above objectives with students' feedback with better learning experience (89%) in gamified-PBL. This gamified-PBL bringing value to the overall learning process and improve teaching and student learning.

Key words: Clinical Cases; H5P; Integration; Problem-Based Learning; Veterinary subjects

Introduction

Problem-Based Learning (PBL) is originating in medical schools as an alternative to lectures (Camp, 1996). It encourages peer groups to investigate on practical issues by active discussion in a small group of students (Duncan et al., 2018). It is a student-centered pedagogical approach to learning through real-world situational problem-solving (Duncan et al., 2013; Leung & Pluskwik, 2018). However, traditional method in conducting problem-based learning is by giving out triggers (wordy handouts) to the student stage-by-stage on a clinical case, and this often leads to disengagement at the end of the process. Considering the above, we took the intitiative to hybridizing problem-based learning with gamification to create gamified mystery-driven problem based learning by using the available WebTools 2.0 – H5P. The purpose of this initiative is to enhance the learning experience of the students by giving them another approach to do conduct the problem-based learning. Gamification is proved to be one of the effective methods to engage students in the learning process (Pesare et al., 2016).

In the era of technology, education of Malaysia is now towards the Industrial Revoution 4.0. The Covid pandemic in the early of this year has pushed the application of digital learning in a faster paced. However, in order to adapt to this new norm in which no physical guidance from the educators (teachers / leacturers) are available during the learning session. Self-engagement becomes the foremost issue that need to be look onto.

As for today the Generation-Z are considered the digital natives, traditional way of teaching and learning approaches will be less effective in engaging this group of students. Thus by converting the

traditional handout-PBL into a Gamification-PBL with can be accesss and work on by using just their hand held devices is our first approach to engage the students for self-learning without physical monitoring as chief and encourage them to play (study) in group to solve the PBL as part of student-centered learning.

Content

A veterinary clinical case – "Dancing Cat" (Peng et. al., 2018) that was initially written into PBL case was used in this project. It is a nine pages case on ectoparasites infestation of a cat that has been divided into three triggers. The first trigger was being transform into game by using one of the content type in H5P. Branching Scenario (beta) was being used to develop this Gamification-PBL. The content in the form of text in the PBL book was then transferred into this web tool by incorporating with more figures and videos (Figure 1). The interface of the Gamification-PBL with figures and videos incorporated is believed to be more attractive and able to give a better understanding to the students other than reading on the text alone (Figure 2). Students are then required to discuss and to search for information in order for them to answer the questions given and to move into next stages (Figure 2).
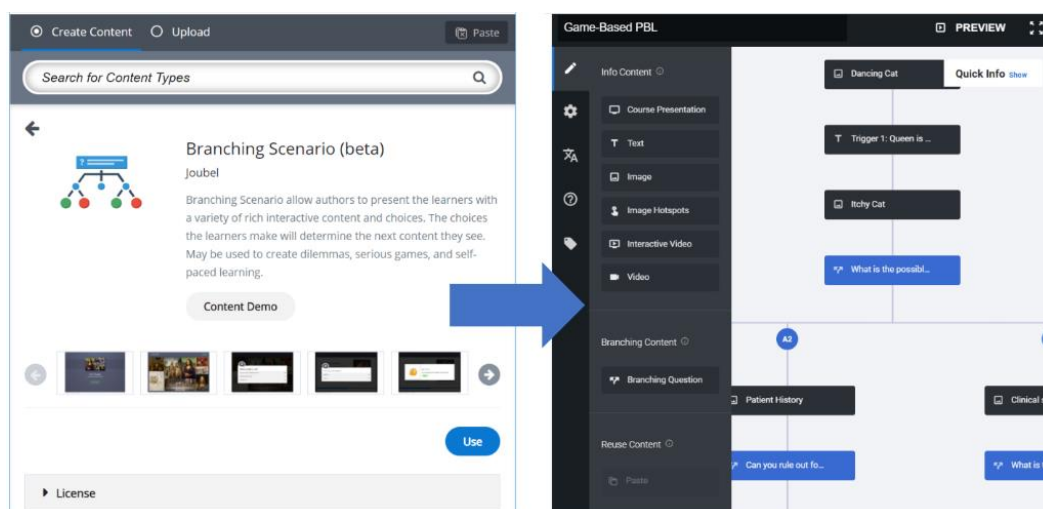
Figure 1.

Branching Scenario (beta) in H5P used to create the Gamification-PBL.
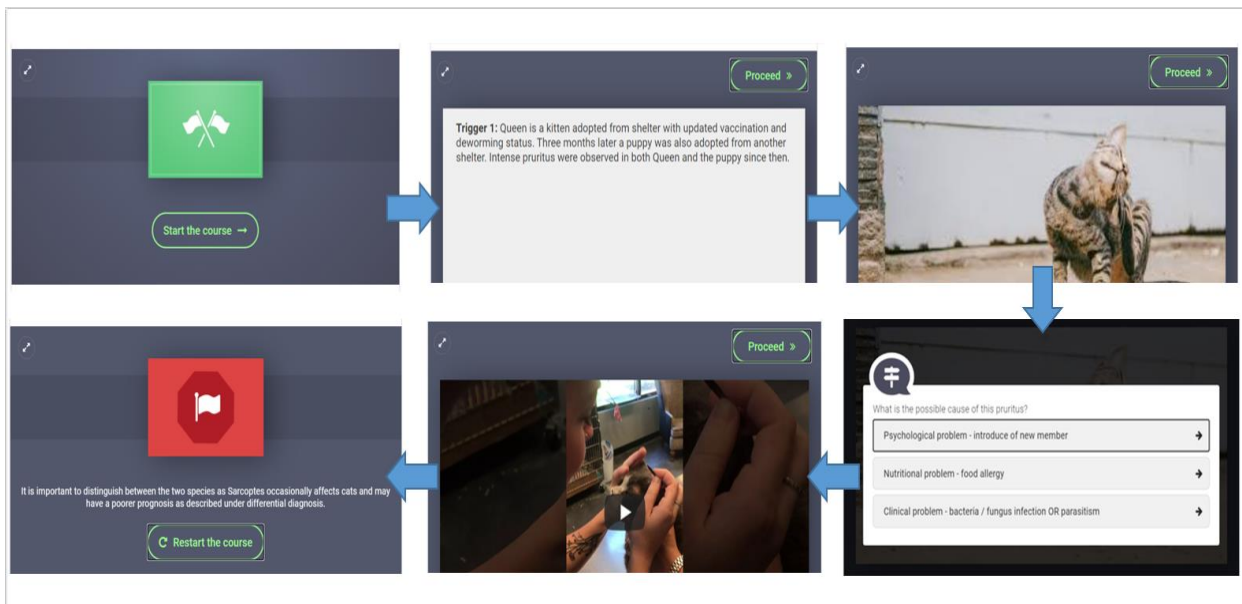
Figure 2. The interface of Gamification-PBL with incorporation of figures and videos.

The Gamification-PBL was then test-run with 45 studens from DVM2 by giving out the traditional PBL handout and later on by introducing them this Gamification-PBL. Feedback from the students were then collected by using Google Form to assess several aspects of learning experience viz. attractiveness; understanding and structure. The results showed that 86.7% of the students found that Gamification-PBL is more attractive to them than having the Handout-PBL. And there were 93.3% of them think that Gamification-PBL is easier to be understand than the Handout-PBL, which might probably due to the figures and videos incorporated as mentioned in the first place. In term of the structure for both approach, there were 84.5% of the students think that Gamification-PBL is more constructive (Figure 3).

As our aims is to engage the students in self-paced learning during this new norm, their opinions on the suitability for using this Gamification-PBL for tutorial (student-centered learning, SCL) and revision (self-paced learning) were also collected. The results showed that 75.5% of the students prefer Gamification-PBL for tutorial and 88.9% of them will opt for Gamification-PBL for their revision (Figure 4).

The Game-Based-PBL is more interesting / attractive than the Handout-PBL.

45 responses

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

46.7%
8.9%
40%

The Game-Based-PBL is easier to be understand than the Handout-PBL.

45 responses

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

60%
33.3%

The Game-Based-PBL is more constructive than Handout-PBL.

45 responses

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

28.9%
55.6%
15.6%

Figure 3. Learning experience of students on Gamification-PBL and Handout-PBL.
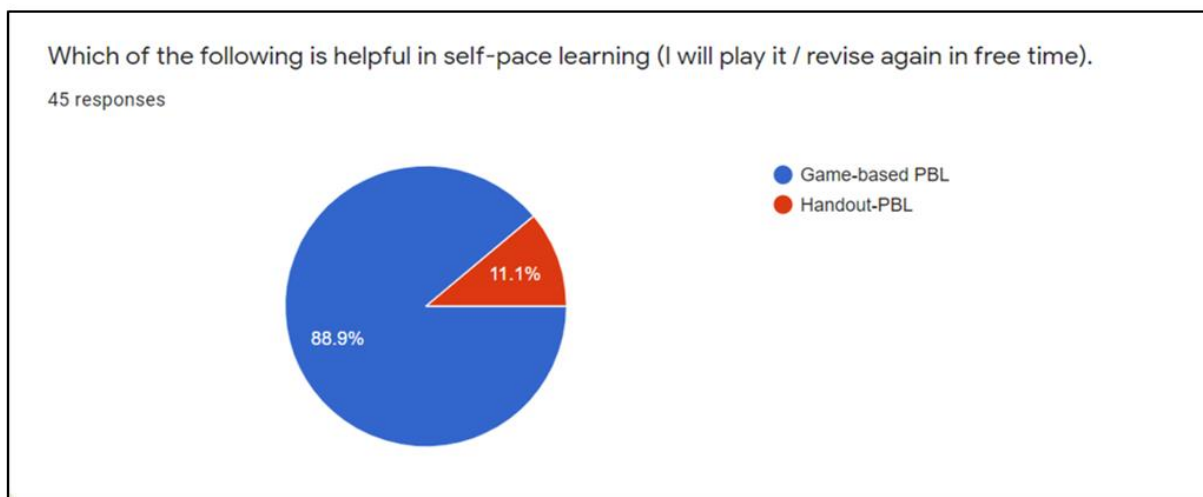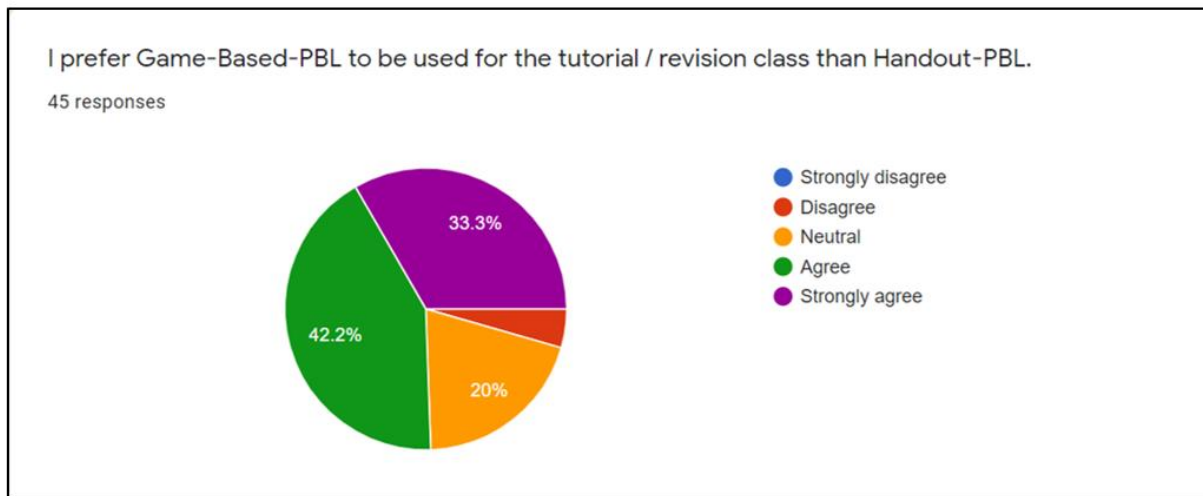
Figure 4. Students' opinions suitability of Gamification-PBL in SCL and self-paced learning.

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CHEMISTRY IS FUN

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Highlights: In the world we live in, technology is literally at the tip of our hands and it is well adapted by the younger generations more than anyone else. The students which are the millennials are born in a digital world where usage of technologies is in every aspect of their lives. Thus, making the digital tools in teaching and learning more vital in order to capture the attention of millennials. Conventional methods of teaching and learning are becoming less significant and outdated, it needs to undergo transformation in order to adequate the needs of 21st century students. This effort starts from the classroom itself. Therefore, in this study, gamification tools were used to attract students to chemistry for better learning and comprehension in the classroom. Gamification is a method that implements the typical elements of game playing. For example, by creating a competitive environment among the students with rules of play and point scoring.
Thus, students' participation and engagement can be enhanced to its maximum level. However, the available researches of gamification on organic chemistry are still scarce. By doing so, Chemistry is fun! was invented as a tool for education to boost students' engagement, provokes their curiosity as well as providing an interactive classroom. This tool was incorporated with three level of difficulties level 1, level 2 and level 3. Different tasks were given to the students based on the difficulties and level.

Key words: please provide up to 6 key words. Please try to stick to one line.

Introduction

These Extended Abstracts are not single abstracts or proposals of intention but should include all the information for an adequate revision to access the quality and innovative practices by the IUCEL 2020 Committee. This extended abstract should consist of minimum of 500 words and a maximum of 1000 words including (References and Acknowledgements).
The preferred file format for submission of your paper is MS Word. This document defines the preferred style to be used to format your paper for submission to IUCEL 2020. Your paper will be most easily prepared if you use this document as the container for your paper, replacing these paragraphs with your own text. This document has all the formats pre-defined and correct.
We encourage you to use this document as a template. If you already have a paper in a different format, you can copy the styles from this document into your current file using the Tools | Templates and Add-ins | Organizer feature.

Content

Table 1: Formatting used in heading paragraph formats, table and figure.

Format name	Font size	Font style	Blanc space	
			before	after
Heading 1	11 pt	Bold	12 pt	3 pt
Heading 2	11 pt	Italic	6 pt	3 pt
Heading 3	10 pt	Standard	6 pt	0 pt
Table title	10 pt	Standard	12 pt	3 pt
Figure caption	10 pt	Standard	3 pt	12 pt

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iGQA: MODUL INFOGRAFIK QAWAID ARABIYYAH

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Highlights: Buku teks pembelajaran tatabahasa Arab sering dikaitkan dengan penerangan yang kompleks serta terperinci lalu menyebabkan pelajar menganggapnya sukar untuk dikuasai dan difahami. Modul Infografik Qawa'id Arabiyyah (iGQA) dibangunkan dalam usaha memudahkan kefahaman dan menarik minat pelajar untuk menguasai ilmu tatabahasa Arab. Kandungan modul ini meliputi topik-topik tatabahasa Arab dalam bentuk maklumat infografik beranimasi. Teks, imej dan audio digabung dan dipersembahkan dalam bentuk yang ringkas, menarik dan berfokus. Modul iGQA ini boleh diakses melalui aplikasi YouTube dan satu eBook khas yang disediakan bagi mengakses modul serta latihan interaktif secara dalam talian.

Key words: Buku teks; tatabahasa Arab; modul; infografik beranimasi; interaktif.

Introduction

Sistem pembelajaran yang hanya melibatkan syarahan menggunakan buku teks khususnya dalam pembelajaran tatabahasa Arab sering dilihat sebagai cabaran kepada pensyarah dan pelajar untuk mewujudkan suasana pembelajaran yang menarik serta efektif. Melihat kepada perkembangan kemudahan teknologi masa kini, aplikasi infografik beranimasi sebagai satu alternatif penyampaian buku teks perlu direalisasikan. Selari dengan perubahan dalam kaedah mengakses maklumat yang mempengaruhi format penyampaian maklumat untuk generasi abad ke- 21 atau generasi digital, sumber pengetahuan visual dengan teks yang ringkas lebih disukai dan menjadi pilihan pelajar dan orang ramai (Ghode, 2012). Ditambah pula dengan bahan multimedia interaktif yang mempunyai visual grafik, teks, muzik, video serta animasi, kesemuanya dilihat mampu meningkatkan kadar penerimaan pelajar mengenai sesuatu bahan yang diajar dengan anggaran sebanyak 30% lebih daripada pelajar yang menggunakan kaedah pembelajaran tradisional (Baharuddin et. al, 2003).

Justeru, satu modul pembelajaran tatabahasa Arab dengan menggunakan aplikasi infografik beranimasi dibangunkan. Modul ini dinamakan Modul Infografik Qawa'id Arabiyyah atau ringkasnya Modul iGQA yang mengandungi elemen penerangan multimedia yang komprehensif dan sistematik.

Content

Modul iGQA merupakan satu modul multimedia yang menggunakan pendekatan Kajian Rekabentuk dan Pembangunan (Design and Development Research) (DDR) (Richey & Klein, 2007). Pendekatan DDR melibatkan tiga fasa, iaitu fasa analisis keperluan, fasa reka bentuk dan pembangunan dan fasa penilaian kebolehgunaan. Proses reka bentuk dan pembangunan modul yang digunakan adalah bersandarkan kepada Model Pembinaan Modul Sidek (2001) dan Infographic Design Model (IDM) (Kibar & Akkoyunlu, 2015). Teori-teori pembelajaran bahasa juga dijadikan asas dalam proses tersebut. Kandungan modul ini melibatkan Kursus Kajian Teks Sintaksis Ibn 'Aqil yang ditawarkan untuk pelajar yang mengikuti Program Ijazah Sarjana Muda (ISM) Pengajian Bahasa Arab, Universiti Sultan Zainal Abidin (UniSZA.

Pembangunan Modul iGQA bermula dengan fasa analisis keperluan yang bertujuan untuk mendapatkan data tentang keperluan membangunkan modul pembelajaran tatabahasa Arab. Kemudian, hasil dapatan tersebut membawa kepada fasa reka bentuk dan pembangunan modul yang melibatkan pakar untuk proses penilaian dan kesahan. Akhir sekali, penilaian kebolehgunaan modul dilaksanakan terhadap pelajar yang terlibat.

Modul iGQA melibatkan penghasilan modul multimedia berteraskan infografik yang mengandungi ciri-ciri yang menarik, mudah, ringkas dan interaktif. Rajah 1 menunjukkan langkah-langkah penghasilan Modul iGQA.
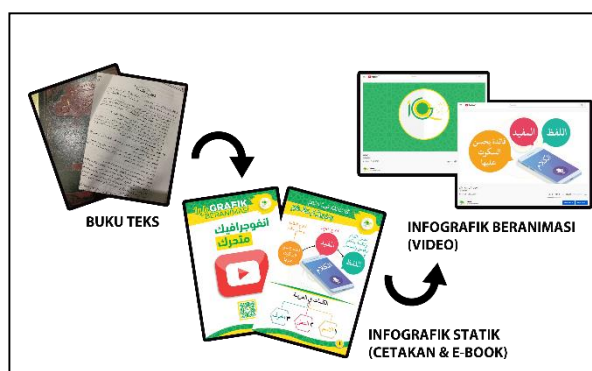
Rajah 1: Langkah-langkah Pembangunan Modul iGQA

Penghasilan modul bermula dengan meringkaskan maklumat daripada buku teks. Seterusnya maklumat tersebut dipersembahkan dalam bentuk infografik statik berbentuk eBook. Selain maklumat berbentuk infografik statik, eBook tersebut juga mengandungi QRCode untuk memudahkan akses kepada Modul iGQA dan latihan-latihan interaktif melalui aplikasi wordwall.com. Akhir sekali, maklumat infografik statik dianimasikan dalam bentuk video dan dimuatkan dalam saluran YouTube khas.

Modul ini berpotensi digunakan oleh pelajar untuk mempelajari tatabahasa Arab secara kendiri dan juga sesuai dipraktikkan dalam pembelajaran secara dalam talian terutamanya ketika situasi pandemik Covid-19 sekarang. Para guru atau pensyarah pula berperanan sebagai pembimbing atau pemudah cara.

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TAYSIR AL-IDAH: MODUL INFOGRAFIK PEMBELAJARAN BALAGHAH ARAB

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Highlights: Pembelajaran bahasa Arab, khususnya komponen balaghah (retorik) sering menjadi permasalahan dalam kalangan pelajar kerana penerangannya yang kompleks dan rumit serta sukar difahami. Penggunaan buku teks yang dipenuhi dengan perbahasan panjang berbentuk tulisan semata-mata menyukarkan pelajar untuk memahami subjek balaghah dengan lebih baik. Berdasarkan permasalahan tersebut, sebuah modul yang dinamakan Taysir al-Idah dibangunkan sebagai satu pendekatan yang lebih efektif dalam pembelajaran balaghah Arab. Penggunaan elemen infografik yang menggabungkan teks, rajah, simbol dan warna dengan terjemahan ke bahasa Melayu menjadi teras dalam pembangunan modul ini.

Key words: Pembelajaran; balaghah Arab; modul; infografik; interaktif.

Introduction

Penguasaan ilmu balaghah dalam kalangan pelajar yang mempelajari bahasa Arab sebagai bahasa kedua adalah penting kerana ia dapat membantu mereka menghayati keindahan sastera Arab yang mempunyai kaitan dengan kemukjizatan al-Quran. Di samping itu, ilmu balaghah ini juga salah satu komponen yang penting dalam bahasa Arab selain daripada komponen-komponen yang lain seperti nahu (tatabahasa), sarf (morfologi) dan sebagainya. Dapatan daripada kajian-kajian lepas menunjukkan majoriti pelajar tidak dapat menguasai ilmu ini dengan baik kerana kelemahan yang wujud dalam bahan pengajaran atau buku teks yang digunakan (Anuar et al., 2013).

Dalam menjadikan proses PdP balaghah Arab lebih dinamik, terdapat kewajaran dan keperluan dalam memfokuskan pembangunan modul balaghah Arab berteraskan elemen infografik mengikut teori dan model sebagai dasar kajian. Kajian Amin et al. (2017) mendapati pelajar berpandangan sesuatu maklumat yang disampaikan perlu menekankan penggunaan warna yang menarik berserta teks yang ringkas dan mudah difahami berbantukan gambarajah, carta atau jadual yang berkaitan untuk menghasilkan penyampaian maklumat yang sistematik dan berkesan.

Justeru, satu modul pembelajaran ilmu al-bayan menggunakan elemen infografik dibangunkan dan diberi nama Taysir al-Idah yang berkualiti, mudah dan sesuai dengan pelajar Malaysia di peringkat sekolah menengah dan pengajian tinggi, sejajar dengan keperluan dalam Dasar Pendidikan Kebangsaan.

Content

Modul Taysir al-Idah menggunakan infografik sebagai medium penyampaian kerana mempunyai ciri-ciri ringkas dan menarik. Modul dipersembahkan dalam bentuk flipbook. Selain mengandungi maklumat yang diringkaskan, modul ini juga mengandungi aktiviti latihan interaktif yang boleh diakses melalui imbasan QR Code. Aktiviti latihan ini menggunakan laman web wordwall.com sebagai medium capaian. Modul ini juga mempraktikkan penggunaan dwibahasa (bahasa Arab dan bahasa Melayu) yang membantu kefahaman murid.

Modul Taysir al-Idah melibatkan topik-topik sukatan kursus Kajian Teks Balaghah al-Qazwini yang ditawarkan dalam Program Ijazah Sarjana Muda Pengajian Bahasa Arab, Fakulti Bahasa dan Komunikasi, Universiti Sultan Zainal Abidin. Kajian ini menggunakan pendekatan Kajian Reka Bentuk dan Pembangunan (Design and Development Research) (Richey & Klein, 2007) yang melibatkan dua fasa, iaitu fasa analisis keperluan dan fasa reka bentuk pembangunan bersandarkan kepada Model Pembinaan Modul Sidek (2001).

Pembangunan Modul Taysir al-Idah melibatkan fasa analisis keperluan yang bertujuan untuk mendapatkan pandangan pelajar tentang keperluan membangunkan modul pembelajaran balaghah Arab menggunakan infografik. Hasil dapatan membawa kepada fasa reka bentuk dan pembangunan modul yang melibatkan penilaian dan kesahan dari pakar melalui Kaaedah Fuzzy Delphi.

Modul ini berpotensi digunakan oleh pelajar dan memenuhi kriteria PAK21 yang menekankan pembelajaran berpusatkan murid. Pengaplikasian teknologi infografik dalam modul ini membantu aktiviti PdP agar lebih terkehadapan dan seiring dengan zaman kini.

Acknowledgement

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FUTURE-READY FINANCIAL MANAGEMENT COURSE FOR NON-FINANCE STUDENTS USING AUGMENTED REALITY

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Highlights: The Future-Ready Financial Management Course (FRFMC) is an innovation that was developed based on a modified Attracting, Informing, Positioning and Delivering model by Simeon as to uncover the gap in the current curriculums. The development of FRFMC is important as it can be used a means to attract non-finance students from the predominantly Society 5. 0 background to show interest in studying finance. The FRFMC development also dramatically changed the way higher-educational institutions, specifically educators in a financial management course to engage more efficiently and effectively with their new batches of digitally native and technologically savvy students.

Key words: future-ready curriculum, finance, technology, society 5.0

Introduction

Today, financial management has become an essential course typically required for students specializing in fields such as business, management, and entrepreneurship (Usama et al., 2018; Kenayathulla et al., 2020; Ramavhea et al., 2017). Non-finance students in these areas were required to at least grasp the basic importance of this course in managing businesses at large, and specifically, in managing the financial and operational sides of businesses. Nevertheless, some students have found technical courses such as financial management, accounting, and actuary difficult to learn, in particular, if they did not have prior basic knowledge on the syllabuses of these courses [4]. There are many reasons that contributed to this phenomenon. Khoo et al. (2021) and Thomas et al. (2021) for example argued for a meticulous review of degree courses in the era of the Industrial Revolution 4.0 in order for latest innovations and technologies to be embedded in these courses which consequently make them more attractive and palatable for students, especially those hailing from the Society 5.0 as well as those from non-finance backgrounds. The integration of technology in the teaching and learning method for finance courses is thus deemed necessary as it can attract students to consequently provide better interest and participation towards the courses.

Although the needs for future-ready courses are growing Andiola et al. (2020) and Bowles et al. (2020), the actions taken on developing and offering the courses are noticeably sluggish. Many past studies have shown the need for future-ready courses for students (see Andiola et al. 2020; Maali and Al-Attar 2020; Aziz et al. 2019). Unfortunately, few studies have tried to propose appropriate processes and methods to develop future-ready courses. Hence, this study aims to develop innovative financial management courses for non-financial management students.

The results revealed that students can easily access data of knowledge and documents of learning using this comprehensive educational technology. This study has also proved the true capacity of FRFMC lies in its ability to attract the interest and boost the motivation of non-finance students in studying a financial management course. This is primarily attributed to FRFMC providing, first and foremost an interactive learning experience to students of the Society 5.0 who are naturally technologically savvy. Insofar as the lecturers are concerned, FRFMC is undoubtedly a sophisticated

teaching method that lecturers can use to deliver the financial management course to the Gen Alpha students. The course is guaranteed to be the most efficient and effective teaching and learning alternative to date to expose the Gen Alpha students to not only a sufficient set of strategically relevant skills, but also to the disciplinary knowledge of finance. Meanwhile, at the university level, FRFMC will unquestionably become an example of excellence and a symbol of pride to its faculty, especially in conducting the university's regular Curriculum Review procedures which have become a set of requirements by the Malaysian Qualifications Agency and the university's Centre of Academic Excellence and Development. In reference to the Ministry of Education and Higher Education, Malaysia, FRFMC serves as best practice that also recommends guidelines to other educational institutions aspiring to transform their existing traditional curriculums to also suit the demands of industries amid the current rapid pace of technological progress. Indeed, FRFMC is aligned with the ministry's current aspiration to improve the existing educational system to adapt to the competitions, demands, and challenges arising from the Industrial Revolution 4.0.

Acknowledgement

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CIKGU LILI CARE: AN INTERACTIVE MULTIMEDIA APPLICATION TO TEACH AUTISTIC CHILDREN ABOUT SAFE TOUCH

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Highlights: Cikgu Lili Care is a multimedia application that provides awareness regarding 'Safe Touch' education towards autistic children from five to nine years old. It is a form of interactive digital storytelling application that supports user interaction. This digital storytelling platform aim to educate children with learning disabilities to understand about their private and sensitive body parts and also the course of action that they should take if someone touch or behaving inappropriately towards them. We hope by using the application, the autistic children would become more careful and aware of their surroundings and able to avoid any potential sexual abuse that is often targeted towards children with disabilities.

Key words: Multimedia, Safe Touch, Education, Autistic, Children, Sexual Abuse

Introduction

Children with autism often are views as 'easy target' by sexual offenders due to their vulnerabilities. Thus, in order to educate and increase awareness regarding 'Safe Touch' among autistic children, we utilized the digital storytelling method by developing an interactive multimedia application that supports user interaction. This digital storytelling platform would help children with learning abilities to understand about their private body parts and action that they should take if someone from their family members or strangers behaving inappropriately towards them. Since, reports on sexual abuse towards autistic children had been increasing, we hope this multimedia application would able to educate autistic children on safe touch, become more aware about their surroundings and protect themselves from any attempt of sexual harassment or abuse.

Content

This multimedia project application contains two main characters who are named Cikgu Lili and Ali. Cikgu Lili as a friendly teacher holds the character that educates the children on a few topics that involve the 'Safe Touch' topic. Meanwhile, Ali is character that represent a child. There will be multiple storyboards for a specific task that users need to interact with the videos. Various choices rely on different follow-up videos and supporting remarks to demonstrate the potential consequences of the choice. The user is then presented with further simulated icon decisions, which Ali can choose in order to respond to the situation. This is consistent with one of the suggestions in Cumine et al. (1998) that teaching decision-making is a genuinely valuable aspect of social skills education for children with autism. In this project development, all characters are in 2-D modelling shapes. To have the motion, several softwares have been used in order to introduce such animation that involves facial expressions, walk and run, body dragger and others.

The developers had designed the characters aligned with children's minds to gain their attention towards the creation.

Prior to the start of this project, we notice many existing 'Safe Touch' multimedia application in the market right now has the main problem i.e. most of the videos and applications regarding Safe Touch do not support learning for children with autism. That includes the style of animation and design principles such as the use of buttons, symbols, colors, characters and the learning environment. According to Kamaruzaman, M. F., Rani, N. M., Nor, H. M., & Azahari,
M. H. H. (2016), "The design principle and guidelines in designing UI for applications that suited the needs of children with autism is extremely important. A good UI considers the demographics' cognitive ability" (p. 893).

Furthermore, most current storytelling does not include any interactivity with the users hence the autistic children would have difficulties to give their full attention to the points that may lead them to a wrong interpretation. In fact, the difficulty of paying attention in the expected ways is widely indicated as troublesome in autism to the extent that some parents have identified problems with attention as the underlying cause of their child's autism. ASD individuals with autism who seem to be more responsive to specific accommodations for attention therefore require interactivities provided in the project platform.

Besides that, multimedia videos on the Web commonly not provide a sequence of series in its content and this seems very worrying since the ASD individuals are seen as learners who are prone to assemble and organize material. To keep up their attention, these children need to recognize the characters involved in the platform. According to Rosset, Ronda, Fonseca, Santos, Assouline and Deruelle (2008), the training studies have suggested that children with autism show greater improvements in emotion recognition when programs include cartoons rather than photographs of real faces. Moreover, clinical and parental reports also state that autistic children spend long periods of time looking at cartoons

These limitations identified in the current literatures and existing Safe Touch application make us motivated to develop a new interactive digital storytelling app that specifically targeting to educate Safe Touch among autistic children.

Developers identified a digital storytelling application regarding 'Safe Touch' is needed by children with autism spectrums. Since around half of autistic people may have a learning disability, this tool would be such a help for tutors or teachers to assist the children throughout the learning process. This align with the point of (SDG 4) which is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. This is also to support the (SDG 16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels, to protect themselves from being a victim for sexual abuse. Through education, autistic children can get a clear understanding of their private body parts and types of touches besides establishing the role and responsibilities of both genders in protecting their bodies. This too can improve ASD children's knowledge, social attitude and skills in dealing with body touches' consent.

This project is a dual language platform that consists of English and Bahasa Melayu to give the target audience option for choosing a language that they prefer and understand better. At the same time, subtitle is provided to assist the tutors and teachers to deliver the content without having difficulties of translating words for the infants.

With the appearance of 2D cartoon and good UI/UX design, this project can attract more of the autistic children's attention on the subject matter. Quality information and learning resources on sequence of video series produced has been validated and approved by experts giving no worries and doubtness. Besides, the appearance of quiz section with rewards and score provided can be a help for the tutors to determine the autistic children understanding and focus. Generation with adequate knowledge and good social attitude can form great community leaders that would protect themselves and others.

In terms of commercialization, this Safe Touch multimedia application would be marketable for parents with autistic children. Parents can download this application into their mobile phone or tablet to teach their children about safe touch. They can download the free version of the application and test Lesson 1 and Lesson 2 for free. If they would like to see other advanced modules (Lesson 3 until Lesson 6) they can unlock the modules with purchases.

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BIOPHARM: A WEB-BASED LEARNING PLATFORM

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Highlights: Web-Based learning is a valid approach for a relatively new and rapidly growing field of biopharmaceuticals in comparison to books. The current invention is a website consisting of drug guides (including data like generic name, dose, route of administration, side effects and precautions) for the top 20 selling biopharmaceuticals. Students gathered the content of the website from various sources and pooled using education tools such as Padlet and Google Cite. Students can access the website via any portable devices during their clerkship and even after graduating. This approach is believed to be able to enhance the students' learning experience feeding students with up-to-date information.

Keywords: Biopharmaceutical; Web; Drug information; Padlet; Google Cite; BIOPharm

Introduction

Biopharmaceutical is a medicinal product derived from biological sources and especially from the drugs produced using biotechnology. Biopharmaceutical drugs have been rapidly revolutionised since its introduction in 1982 as compared to the market of all other drugs [1]. They are also dominating the therapeutic options of various chronic diseases, including chemotherapy regimen. Recent advances in the field of biotechnology have facilitated the production of various biopharmaceuticals, which nearly 40 % of the total number of new drugs approved in 2018 [2].

Bachelor of Pharmacy, as of other health care courses, requires the students to gain up-to-date knowledge on the biopharmaceuticals available in the Malaysian market. Unfortunately, the field of biopharmaceuticals is relatively new and rapidly growing hence, the learning materials are scattered in various sources, and new information is constantly being reported. We reckon that web-based learning is a more valid platform compared to books to feed students with new and valid information. In addition, the application of a website as a learning platform could complement the printed books especially targeting the tech-savvy students of generation Z.

Content

The current invention is a website consisting of drug information of the top 20 selling biopharmaceuticals 2020. A total of 116 students from year two (2) of Bachelor of Pharmacy participated in the collection of data. Briefly, the students were divided into 20 groups and each group was assigned to a biopharmaceutical product. Each group gathered information, such as generic name, dose, route of administration, side effects and precautions of the pharmaceutical drugs from various sources in the form of drug material sheet in English and Bahasa Malaysia. The findings were also designed as an infographic for an easy-to-understand and quick reference. These drug material sheets, and the infographics were then shared in the Padlet (Figure 1) to validate the content by other groups. Upon the content validation, the materials were presented in Google Cite in the form of a website

(Figure 2) and the link was shared among the students for their feedback. It should be emphasised that all work was done online, and no hard-copy materials has been involved at any stage of this process.

The approach of web-based learning to engage students in the process of active learning is not a new method of learning [3]. However, to the best of our knowledge, there is not a single portal that is collectively providing pharmaceutical guides on various biopharmaceutical drugs. This website could be one of the pioneers. This website will serve as a comprehensive and up-to-date guide of biopharmaceutical drugs. It is presented in a clear and user-friendly manner. We believe it is an ideal tool for students and health care professionals to learn on biopharmaceutical drugs as it can be accessed via computers and mobile phones.

On the other hand, the student feedback on the learning activity showed that the majority of the student preferred the design and knowledge delivery through web-based learning. Indeed, many commented this approach effectively aid them to learn the biopharmaceutical drugs.
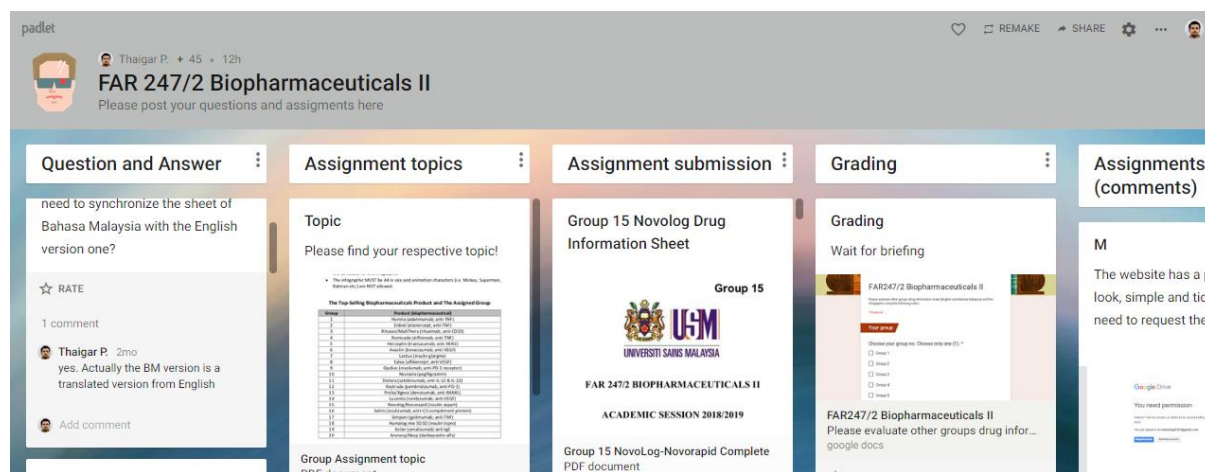
Figure 1: The Padlet wall showing student activity of data collection and validation. The link is https://padlet.com/thaigarp/wy981b2kcjf8.

Figure 2: The home page of BIOPharm. The website is consisting of generic name, dose, route of administration, side effects and precautions of top 20 selling biopharmaceuticals 2020. The link is https://sites.google.com/view/biopharmaceuticals/home.

The content of the website will also be updated every year by the future batch of students to accommodate with up-to-date information. Hence, the website has the potential to provide a continuous learning platform for the students. At the present stage, the website does not have any commercial value. The infographics of the top 20 selling biopharmaceutical drugs will be copyrighted.

In conclusion, the BIOPharm website may become a handy option with up-to-date information at a very low cost to educate students and health care professionals with biopharmaceutical drugs.

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E-FIQH AL-MUAMALAT

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Highlights: E-Fiqh al-Muamalat is a website developed as a reference for Muslims. The discussion in the E-Fiqh al-Muamalat is related to trading/commercial rules such as buying and selling, renting, mortgages, loans, debts, wages, usury issues and others. All economic activities are legally permissible if these activities do not transgress any of the tenets of Shariah. In line with this maxim, all forms of business transactions that transgress any of the tenets of Shariah are considered invalid. Therefore, to give right understanding there is an urgent need to develop an attractive website. The innovation is based on learning through the digital and online technology is concentrating on teaching and learning of Fiqh al-Muamalat for students. To achieve this objective, the researchers focused on benefits from mastering students in the field of modern technology for more effective and fun learning, to implement an education
4.0 which is in line with the 4th Industrial Revolution. A clear awareness and understanding of transactions and contracts in Islamic finance will prevent the Muslim community from engaging in transactions and financial products that are against shariah law.

Key words Fiqh al-muamalat, teaching, learning, innovation

Introduction

The literal meaning of the term "muamalat" (plural of muamalah) is the transactions "while its technical idea is any form of mutual dealings held between men to solve their everyday needs, especially in matters relating to trade and commerce". The rulings governing commercial transactions between the parties involved.

All economic activities are legally permissible as long as these activities do not transgress any of the tenets of shariah. Basic principles that in forming shariah rulings in muamalat is permissibility as a rule. The status of all matters other than rituals is permissible until evidence is given that a certain matter is prohibited.

In line with this maxim, it is the unanimous opinion of all four major Islamic shariah School of thought (Hanafi, Maliki, Shafii and Hanbali) that all forms of business transactions that transgress any of the tenets of shariah are considered invalid. No contract should be made for selling or buying forbidden products such as alcohol or any other forbidden substances. The contract entered by the parties shall be free from any elements of coercion, fraud, misrepresentation, or other illegal means. Likewise, no contract should be made for any financial deal based on usury (riba). Contract involves in gambling (*maisir*) is also forbidden in Islam. Contract that involves major uncertainty (*gharar fahish*) is also forbidden and may make the contract voidable. All financial transactions must be conducted in such a manner that all the parties are clear about all the important facts including the terms and conditions of their dealings.

Content

Encourage active learning via interactive website. To create the learning resources, activities, and assessment through web technology.

Figure 1: Element of teaching and learning in E-Fiqh al-Muamalat

Effective style of learning and teaching by applying an interactive collaboration and flexible learning with two- way text-based online chat, which is widely used in e-learning. To develop an e-learning teaching tool that educate student/public about Islamic rules in transaction and business. To benefit from mastering the skills of students to use modern technology in the process of learning.

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WHERE IS MY CASH?

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Highlights: This is an idea to develop a mobile application named *Where is My Cash?*. It is as an assignment tool for accounting students. Through this apps the accounting students will be assessed by their lecturer based on their ability to assist and create awareness to informal business owners about the simplicity of recording business financial transactions. This apps works by connecting lecturer, students, and informal business owner. Students will be able to access the cashbook interface that they will work out with informal business owner. The lecturer will be able to see the assignment progress perform by his/her students.

Key words: assignment tool, cashbook accounting, informal business

Introduction

For accounting students in higher education institutions, it is common for lecturer to designate assignment on creating a full set of account to real business operations. This assessment method is aligned with Malaysia Education Blueprint: Higher Education 2015-2025, where students are required to experience learning from the community or known as Community Based Learning (CBL). All these years, we identify one common issue among informal business owners that is the reluctancy of keeping financial transaction records of their business. Although accounting can be too complicated for some, leaving the business owners ignoring the importance of financial recording can be perceived as irresponsible especially if you have got the knowledge. Thus, we aim to propose an apps that allow students to teach informal business owner basic knowledge to record financial transactions and at the same time create awareness to informal business owners about the simplicity in keeping business financial records. At the same time, their lecturer also able to monitor the students progress while the students are still on the field work.

The term informal business means that the business is not registered with Companies Commission of Malaysia. Informal business owner in this proposal referring to small-scale businesses that rely on the owner's competencies. In many cases, if the business able to generate revenue from what they are selling today, they will assume that is their income and it will be then used to purchase materials to make the items that will be sold the next day. Because it is a small business for daily survival, almost all transactions are performed using cash only. Nevertheless, if the informal business owner is asked what the profit per product or daily are, it is difficult for them to provide the answer.

Through accounting students, who are now learning in higher education institution, they can help the informal business owners by showing how simple the process of financial recordings can be and shares the advantages the owner can get from the process. *Where is My Cash?* app is for accounting students to deliver and share their theoretical knowledge and use it to assist informal business owner making a basic financial recording, and this is done under the lecturers' supervisions.

Content

This is an idea to develop a mobile application named *Where is My Cash?*. It is as an assignment tool for accounting lecturers and students. Through this apps the accounting students will be assessed by their lecturer based on their ability to assist and create awareness to informal business owners about the simplicity of financial transaction recording.

Where is My Cash? app works by connecting lecturers, students, and informal business owners. First, the lecturer will register to use the apps. Then, the lecturer needs to create at least a class in the app. By sharing the class code, the students will then sign up for the class. Students will be able to access the cashbook interface that they will work out with informal business owner. The lecturer will be able to see the assignment progress perform by his/her students.

Among 9 HIEPs elements, Service/ Community Based learning (SBL) has been made compulsory as mentioned in Malaysia Education Blueprint: Higher Education 2015-2025. *Where is My Cash?* app idea supports SBL. This app will empower students to learn by doing in helping and contribute their accounting knowledge to the community. The lecturers, who owns the apps will be able to assess students while they are on the field by referring to the *Where is My Cash?* app.

Where is My Cash? will assist lecturers in assessing their students who are learning accounting via the process of sharing knowledge on keeping financial transaction records of informal business. This sharing will create awareness to the informal business owners on how proper financial transaction record will enhance their ability to make better business decision especially in sustaining the business. For students, this is a lifelong learning experience. For lecturers, this app will enable them to monitor the progress of their students during field assignment.

Once commercialized, *Where is My Cash?* app can be used by educational providers that offers accounting programs. The lecturers will be the grateful to the existence of the app and the user-friendly features especially in assisting the lecturers making assessment to students even when students are on a field assignment. It is a win-win product where it benefits lecturer, students, and informal business owners. Accounting education is massive in Malaysia, and it is still a profession that is highly demand. The numbers of informal business are also not small in Malaysia, and they contribute to the economy as well. Thus, it is important to accommodate informal business owners' need of sustaining their business via higher education students who can learn by doing concept through the features offers by *Where is My Cash?* app.

RELATIVE MOTION ANALYSIS SOFTWARE FOR ENGINEERING EDUCATION

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Highlights: This innovation focused on the problem solving and simulation of an engineering software tool by incorporating multimedia and new pedagogical concepts to support the interactive 2-D and 3- D environment. The empirical results indicated that the interactive engineering problem solving software could assist the Mechanical Engineering students in the topic of relative motion analysis. The system is fully integrated to be independent of the textbook, to supplement the teaching and learning process. The questions, objectives, formulas, diagrams and charts are presented in sequential order within the simulation tool. 2-D model and 3-D model are integrated with virtual realities to support the visualization of the dynamic motion of the engineering model. Interactivity features (25 patterns of interactions) are available to ease the visualization process and engage the students better with deeper learning experience. Best instructor knowledge is transferred to students through the interaction process with the software.

***Key words**: Engineering Education 4.0, Problem Solving Software, Computer-aided Learning*

Introduction

In the era of 4th Industrial Revolution, digital media technologies have become one of the most attractive and promising technologies in education. For engineering education, one of the common problems faced by the students is the difficulty in visualizing some of the engineering concepts that involved dynamic motions, complex calculations particularly in z-axis. The problems posed to these students usually needs to be solved by using appropriate formulas and may lead to a series of working steps before obtaining the answer. Present commercial problem-solving software for engineering is incapable of doing so because most of the available educational software in engineering (mechanics dynamics domain) do not show all the steps as how the problem was solved. This provides evidence that the student may not learn and visualize the engineering problem. This invention focused on the problem solving and simulation of an engineering software tool by incorporating multimedia and new pedagogical concepts from interactive 2-D to 3-D environments. The software tool was tested with Mechanical Engineering students and instructors from the College of Engineering (UNITEN) and the result showed that the interactive simulated multimedia engineering learning tool could assist the Mechanical Engineering students especially the slow learners by enhancing their learning motivation and improved the visualization ability in the topic of relative motion analysis.

Content

The innovation is an interactive multimedia problem solving tool that guides the user step by step to solve the problem. The product was design using various multimedia software tools and designed based on the ISO 9126 software engineering standards. The ADDIE model was used as the methodology for the software development life cycle. The software has been tested with over 240 engineering students and validated by the HCI domain expert.

User interfaces are important means of communication between user and the product. Effective user interface integrated with proper learning pedagogy ensures transfer of learning has taken place successfully. The innovation has been designed in such a way that it achieved high usability score (SUS score) and has effective patterns of interactions. Each pattern of interaction has been carefully design based on the needs of the problem and users to solve the particular engineering problem. Our design process has helped in simplifying the engineering problem better and aid in visualization of the engineering models.

Because the present education system demands higher level of technological tools to be used by students to enhance their learning process (better engagement and higher interactivity) especially in the education 4.0. This software tool has significantly benefited engineering students to visualize the engineering problem presented in the software. The students are able to comprehend the problem better and apply the right equations which are otherwise difficult to learn from the static media such as textbook and linear presentation through PPT slides and video presentation. Our design process has helped in simplifying the engineering problem better. The software tool and its usability were tested using both the usability instruments of SUS (System Usability Scale) and PSSUQ (Post-Study System Usability Questionnaire) with engineering students and instructors. The software can act as a quick revision tool for problem solving exercises (in line with Bloom's taxonomy – Levels 4 (Analyze) & 5 (Evaluate)) and also support individualized learning and control in response to education 4.0

From the educational perspective, this engineering problem solving software has significantly benefited engineering students especially those students experiencing difficulty in understanding of the Engineering Mechanics Dynamics course in some situations (the 3-D dimensions that involved x, y and z-axis) to visualize the engineering problem. The results of the study indicated that the engineering problem solving software has potential in promoting engineering education in terms of visualization, navigation and interactivity. It provides essential & tested tools for solving engineering problems and also act as supplementary tool for slow learners (in term of learning science and mathematics).

The engineering problem solving software integrating innovative approach by incorporating digital media technologies with virtual realities and new pedagogical concepts through interactive 3-D environment representation in aiding the teaching of Engineering Mechanics Dynamics course in response to the education 4.0. The work is one of the pioneering efforts in Malaysia to address the need for computer-based problem-solving software packages for the domain of teaching Engineering in Malaysia especially in the mechanics dynamics domain and has high value to be commercialized together with textbook, direct sales or through secured website / mobile apps / software as a service (SaaS) to the tertiary institutions. The engineering problem solving software was copyrighted in 2017 (no: CRLY00006077) and applied the patent filing in 2018 (no: PI2018002183).
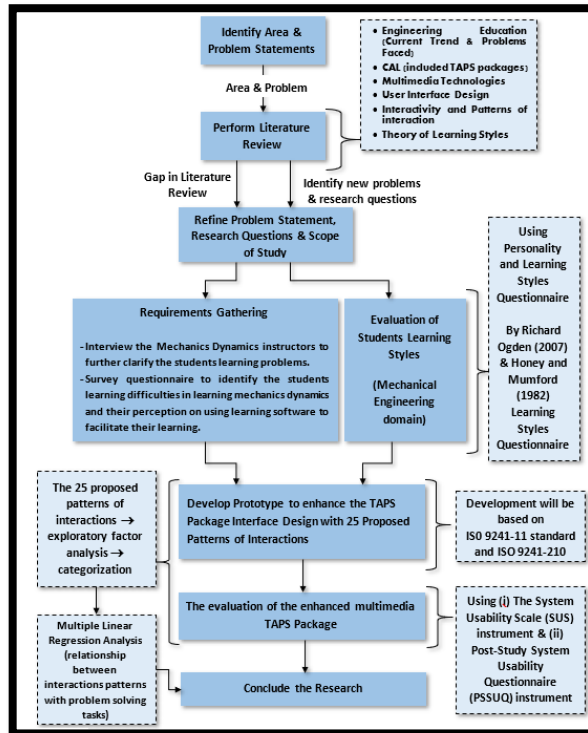
Figure 1: Project Development Flow Diagrams

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ELECTRONIC VISUAL & AUDIO (EVA): A SELF-DIRECTED LISTENING PRACTICE FOR ENGLISH LANGUAGE LEARNING BEYOND THE CLASSROOM

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Electronic Visual and Audio (EVA) is a self-directed listening practice that has been modernised with the goal of assisting learners in learning the English language (specifically, listening skill) using current and cutting-edge technology such as the Quick Response (QR) code and mobile applications. The existence of EVA has eliminated the need for students to solely rely on teachers to play listening audio in class using old-fashioned and traditional radio or computers. The invention of this tool is very timely during the era of pandemic outbreak where the teaching and learning sessions are transformed to the remote and online modes. Students can now do listening practices at their own pace by scanning the code that triggers the video and audio, and answer the questions that follow, using their own smartphones, earphones, and internet mobile data/home wireless. Another important feature of this self-directed listening practice is the 'EVA community' platform, which allows users to engage with the global context in line with the 21st century learning. EVA users from all over the world can share their thoughts and opinions on the Higher Order Thinking Skills (HOTS) questions. This is not only to encourage the learners to be active in their learning but also assist them to understand other people's perspectives about the issues being discussed in the practice.

Key words: *Quick Response Code (QR code), mobile learning, listening practices, self-directed tool, video media*

Introduction

The emergence of a wide variety of advanced technology has created a positive impact towards 21st century education. In today's world, learners acquire new language not only through formal education in school, but also through informal way of learning where the materials and platforms are readily available online. The unlimited access to various types of reading materials, audios, videos, notes and practices provides an opportunity for learners to be autonomous in their own learning. According to the Malaysian Education Blueprint for higher education (2015 – 2025), the current education system should actively pursue technologies and innovation that are relevant to the learners' needs, as well as those that enable greater personalisation of learning experience. Malaysian learners are also expected to be proficient not only in Bahasa Melayu, but also in the English language. With this high aspiration, the role of activities in English language classrooms cannot be neglected.

In the past decades and even until today, listening lessons were challenging to be conducted with the use of radios where teachers played cassettes or CDs for the audio to be listened to by the students. Teachers or even students on the other hand, had difficulties to select specific tracks on the cassettes or CDs (eg. replay or pause the audio) during the listening activities. Listening lessons now get tougher

and more challenging with the current mode of learning during the COVID19 pandemic outbreak where everything is conducted remotely via online.

To overcome the challenges faced in conducting listening activities in the ESL context, Electronic Visual & Audio (EVA), a self-directed listening tool is designed and developed. EVA allows learners to become independent in performing their listening activities with little guidance and less teacher-centered input. Using their own smartphones, earphones or headphones and internet mobile data, learners can now do listening practices at their own pace. By scanning codes in the module that trigger the selected video in YouTube, learners will also be automatically directed to the video media materials on the screen of their smartphone to assist them in completing the assigned language practices. This modern technology in teaching and learning allows students to watch the entire video even when the internet connection is very slow. This feature provides the opportunities for students to not only watch the videos, but also to replay, pause or even stop the videos, according to their own individual pace. This is important in ensuring that the lessons exclusively cater to the students' different needs and abilities in understanding a listening material.

Adopting the video media theory by Gruba (1997) as a foundation for the development of this self-directed tool, authentic videos based on meaningful, real life situations are utilised as the fundamental materials. This theory supported the statement made by Prensky (2001) who wrote about the digital natives learners that **prefer the incorporation of multimedia as part of their learning tools**. Today's learners spend their entire life surrounded by technologies and engage themselves in social media platforms. They scroll their Facebook, Instagram, Twitter etc., watching updated videos about anything whenever they want. Therefore, the development of this tool is tailored to the learners' needs and, thus EVA definitely suits the millennial learners who are naturally IT savvy.

Content

Learners' today want to be taught lessons as close to real life as possible (Manuel et al., 2018). Unfortunately, the current listening lessons are still using the traditional method (audio only) that does not cater to the learners' needs for the 21st century learning. However, in today's world where their life cannot be separated from technology and the Internet, listening lessons using audio and moving visual images (video media) are made possible for them. Learners not only have the chance to get access to millions of authentic online videos from all over the world, but also have the freedom and flexibility to pause, stop or replay the video according to their needs. Therefore, EVA self-directed listening tool is the best device to cater to all the different needs and abilities of the learners in this digital era. Sets of listening practices comprising authentic, meaningful, and real-life contexts for the self-directed learning module were prepared according to the different learning outcomes for intermediate level of tertiary education learners. This innovation is aimed to modernise the existing traditional method in teaching and learning of listening skill into an on-the-go practice.

In a second language classroom where listening skills are concerned, the application of advanced technology in teaching is undeniably possible as today's **learners** are readily equipped with smartphones and Internet connection. Thus, to be relevant with today's situation, a model of listening practices that allow students to listen and also watch the movements and gestures of the characters in the audio (video media) is demanded. EVA is highly recommended as it is an innovation that integrates the use of QR code and mobile applications as to give an interactive experience for the receptive skill in language learning.

EVA consists of 15 sets of practices covering a variety of topics that are relevant to the students' interests. Each set of practice is accompanied by 1 QR code that links the students to the video, 5 listening comprehension questions, 2 Higher Order Thinking Skills (HOTS) questions and a link to the 'EVA community' page. For listening comprehension questions, students can circle the correct answers on the module itself. While for the HOTS questions, students are required to submit their answers on the 'EVA community' page where all responses submitted by all EVA users can be found on this interactive page. The 'EVA community' page can be accessed by clicking on the QR code attached together with each of the practice.

Importantly, through the incorporation of audio and moving visual image (video media) in completing the practices, the module is a relevant tool that meets the current learning motivation and interests of the digital natives. It provides the students with authentic language use related to every day issues that are not scripted, and framed in a controlled learning environment. Moreover, the listening activities that occur in EVA utilise the audio as well as visual modes whereby students get to listen to the language used as well as watch the video of the given contexts. Hence, the dual modes of learning process help the students to maximise their understanding of the language used within the authentic contexts portrayed. The value aspect of the listening materials has also been embedded in the module as to be relevant to the current revolution of Education 5.0 that injects the moral lessons to the learners. It is also to give an interactive experience of a real-world environment to the learners in practising their listening skills.

Hedge (2008) states that in this age of science and technology, the majority of the learner possesses Android or iOS sets and mobile phones for a wide variety of purposes. Therefore, to be relevant with today's advancement of technology, listening practices should be considered to be conducted through mobile application where students only need smartphones, earphones and Internet connection. Teachers, on the other hand, are only required to provide the modernised version module, with a current technological advancement namely the QR code, that directs the students to the listening video media. All in all, EVA is a powerful tool that allows learners to explore the language via its listening practices that are not only easy but also interactive!

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"HELLO DR" BOOKING DOCTOR MOBILE APPS

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Highlights: A well-designed mobile application can perform actions much quicker than a mobile website. Apps usually store their data locally on mobile devices, in contrast to websites that generally use web servers Apps can further save users' time by storing their preferences, and using them to take proactive actions on users' behalf. "Hello Dr" mobile application dedicated to different categories including emergency care, the home visit, self-diagnose and also the point and redeem to both users. This healthcare mobile apps will help the clinicians or physicians to take the decision proactively.
The power of accessing anything or anywhere at any time is what the mobile technology nowadays offer to shape the future and health goals. Whether it is about to keep a tab on sleeping patterns or diagnosis of any physical ailment, the health-based application have now become a norm to provide the better care and health to the facilities the right at the fingertips of the users.

Key words: mobile application,, general doctor, online, patient, checkup, home-visit.

Introduction

Nowadays people keep seeking for a convenience way to be treated for their health as soon as possible or using online. Doctors are lifesavers, and that's why they might not be too far away from those in need of medical services. With so many people in need of medical treatment, physicians need to make their services affordable and usable to their patients. One thing they can do for this is offering home visit. In this time and age where everything and anything can be found on the internet or, in other word, it easily access. People need to take advantage of the opportunities that mobile application to call the doctors in presents.

Having the mobile application to book a doctor is one step to making the patients satisfied with the services provided. New patient will want to book an appointment with the doctors once they know that they have made the booking process easy. Just tap and call the doctor to come for checking them. If they are impressed with their meeting with the doctors who consult them, they will keep calling to get the treatment.

However, 2020 is the biggest challenge to all worldwide because of the pandemic corona virus (COVID-19). Malaysia one of country that face to pandemic COVID-19, the virus confirmed reached Malaysia in January 2020, and it is important to offer this mobile application to all people that need to be treated. Patient might afraid to go to clinic or hospital to get the consultation since Malaysia has to face the pandemic COVID-19. So with this mobile application, it might be easily to them to get the consultation if they are sick.

Content

"Hello DR" Booking Doctor Mobile Apps

A well-designed mobile application can perform actions much quicker than a mobile website. Apps usually store their data locally on mobile devices, in contrast to websites that generally use web servers Apps can further save users' time by storing their preferences, and using them to take proactive actions on users' behalf.

Background of the system

A more efficient solution is to go through with the online mobile application that makes a simple way of life. People use electronic transactions to be safe, more secure and make easier for their life. Patients are difficult to handle by direct paper appointment. In the past two decades, health care has been the most important in the public service in developing countries. It is difficult to get an appointment since it pandemic and to get a queue in hospital or clinic to get hospitalize. The key idea for this project is to get easy booking a doctor through a mobile application that solves the problem for the patients. With this planning, the patient workload will be minimized, which could require the specifics of the doctor and the hours requires, and the money will be saved by the both doctors and patients. The doctor should arrange a period of his own time.

Once the patient gets the treatment, the doctor will send the report to the patient and medicine will send off to their home. Doctor will contact pharmacy or clinic nearby to send the medicine via this application. This mobile application is very beneficial for both patient and doctor. For the security and safety, before patient enters the application, they have to input their detail before log in to this application. Doctor also have different log in which they need to put their MMC number to recognize they are truly doctor or not. This application has different access for the different user.

User Scope

The user involved in this system are:

Doctor: Doctor who will be consult their patient at home
Patient: Who will get the treatment at their home and book a doctor for consultation.
Admin: Will monitor the flow of the other users.

Function Scope

Based on the objective of the proposed requirement is to develop an application where Patients and Doctors will be able to meet up and get the consultation at patient's home. This online doctor's mobile application covered only at Seri Kembangan.

In this mobile application, there are certain core-features that could provide to this booking doctor mobile application.

For doctors:

Location: This can include the address of his clinic or the hospital he works for. There are many things could be added to this location feature. Like the distance counter, to show how far the patient is from the doctor.

Photos: Doctors can add photos of themselves, their hospitals, and anything related to work. This will help them to advertise themselves on this application and to prove authentication.

Specialty: This section will include their experience, area-of-expertise, services they offer, certifications, and more.

Rating: Reviews and ratings develop trust among other patients. So ratings and reviews are a great feature to have.

For Patients:

Name and Phone Number: The basic most important detail for patients to give is their name and contact number. This only helps in increasing accessibility, allowing doctors to make direct contact if necessary.

Address: Address always comes in handy in not only locating nearby available doctors but also to locate in case of an emergency.

Other information: Any past diagnosis or history of certain illnesses, age, gender, and more.

Search Function According to Category: A mobile application solution is developed to provide ease of access. Since its dealing with an on-demand booking doctor mobile application, there needs to be a search function for patients. This search function should be available for all categories from heart, bones, to every area and allowing patients to find a suitable doctor for themselves.

Development Tools

This "Hello DR" Booking Doctor Mobile Apps developed in Android Studio Code (as stated in table). This involved the use of Java to build native apps in this android application, and it is the most common way to do it.

The use of database in this mobile application is Firebase. Firebase is a good choice to start with either write a brand-new application or rewrite an existing one from scratch. Additionally, firebase helps in the easy storing and retrieval of dynamic content.

NO	HARDWARE	SOFTWARE
1	Laptop	Firebase
2	Smart phone	Android Studio
3	Mouse	Microsoft word

Importance of the system

The biggest needed while having this booking doctor mobile application is providing to the patient about the accessibility ease. The telephonic appointment will cost to the patient money and time is replaced by an application that is through phone and only requires the internet connection. Especially with the pandemic COVID-19, this application become necessary for identifying any potential to do the consultation.

Advantages of the system

Since it is online booking doctor application, this application can connect to the pharmacy or clinic for dispensary. Doctor will order the medicine through this application and pharmacy or clinic nearby will standby for the medicine. They will deliver by the delivery service provided such as lalamove or grab.

Another great feature that could be in this application is GPS Tracking. This application is to track any patient that suddenly requires an emergency and is unable to respond through the smart device. Or patient need to track their doctors that have arrive or not to their house.

Table 1: Comparison of the existing system

FUNCTION	DOCTOR2U (not used)	BOOKDOC	HELLO DR
Booking doctor	√	√	√
Home-visit	√	x	√
Medicine Delivery	√	x	√
Point and Redeem	x	x	√
Schedule	x	√	√
History	√	√	√
Self-diagnose	x	x	√
Notification	x	√	√

An ontological framework is very much promising to develop interoperable IT solutions for various segments of today healthcare systems. The combination of time, technology and the rapid increase in population has been the drive force to introduce a mobile application since it will be necessary to the people. With the existence of the system which book for the clinic booking appointment, the registration will different and patient can check the status of the doctor so patient do not hesitate to the doctor who they book recently.

Commercial Value

As the world battles with Corona virus (COVID-19), despite of millions under self-quarantine, the doctors, nurses and medical staff all over the world are once again emerging as heroes. Yet, when the hour demands social distance and isolation, technology in healthcare could be the save grace. At this point, everyone has their choice to get themselves check if they feel unwell. But since the pandemic COVID-19 has affected to hospital and supplies which include the global economies, it should be create the on-demand application for book a doctor to get the consultation or mild case scenarios.

These booking doctor application have seen exponential growth to the market. According to MarketsandMarkets news (2020), by the year 2021, the global medical technology market is expected to reach 280 billion USD. And there Is undoubtedly interest and create a new platform for healthcare. Now, the doctors can be leverage the benefits by use this application that provide their services to everyone who isolated in their homes.

The biggest needed while having this booking doctor mobile application is providing to the patient about the accessibility ease. The telephonic appointment will cost to the patient money and time is replaced by an application that is through phone and only requires the internet connection. Especially with the pandemic COVID-19, this application become necessary for identifying any potential to do the consultation.

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ENVIRONMENTAL AWARENESS FUN GAME VERSION 2 (ENVIRONESS V2)

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Highlights: Environmental Awareness Fun Game Version 2 (Environess Game V2) is a board game created to achieve the goal of increasing the development of knowledge and information especially among communities emphasizing environmental awareness in attractive and innovative way. The Acts, fines and campaigns are provided in the form of games in this product that can make players are more likely to remember hence influence good attitudes in environmental awareness. Augmented Reality (AR) and QR Code Generator elements present to add layers of digital information into it. An electronic element was built in to make this game more interactive for IR 4.0.

Key words: environmental awareness; environmental knowledge; augmented reality; environmental education; board game

Introduction

Rapid urbanization and pursuing of better quality of life has caused Malaysia to shift towards environmental degradation resulting from the series of challenges from environmental issues. Harmful waste secretions, climate change, environmental pollution and ecosystem breakdown, to name a few, are the environmental catastrophes that are accustomed by the general public. Based on the study accomplished by Altin et al. (2014), environmental awareness is referred as awareness to the environmental issues and active involvement in environmental organizations. In spite of that, environmental awareness is a trigger to nurture positive attitudes and affection towards positive environmental behavior (Karatekin, 2014).

Product development background

Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. It is focusing on processes that promote critical thinking, problem solving, and effective decision-making skills. Environmental education utilizes processes that involve students in observing, measuring, classifying, experimenting, and other data gathering techniques. These processes assist students in discussing, inferring, predicting, and interpreting data about environmental issues. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions. These experiences help students to develop sense of responsibility to take care of the environmental sustainability. Hence, it is important to increase the environmental knowledge and awareness from every level of age, starting from educational institutes. Due to this, Environess Game was created to increase the environmental awareness and knowledge among community in fun and interactive way.

Research studies show that board games such as Snakes and Ladder result in children showing significant improvements in aspects of basic number skills such as counting, recognizing numbers, numerical estimation and number comprehension. They also practice fine motor skills each time they grasp a game piece. Playing board games also can improving children's executive functions. The game is played just like traditional "Monopoly" or "Saidina" but "Environess Game" more focused on the knowledge and information especially among communities about environmental awareness. In order to enhance the innovative element in the product, QR Code and Augmented Reality (AR) technology has been installed, adding a layer of digital information to make it more interactive and interactive, suitable with IR 4.0.

Product Innovativeness

Environess Game is a board game that consists of materials like moving tokens, dice, cards, chances and penalty. Despites its features, Environess is not similar to the typical board game available in the market. Environess itself focusing on the environmental aspect where real acts, fines and issue was implemented in the game. Through Environess, the board game was upgraded to another level by adding the digital elements like QR Code and Augmented Reality (AR). A set of questionnaires was prepared to measure the level of knowledge among payers before and after the games. This set of questionnaires can be accessed by scanning the QR Code available in the Environess board. While AR enables the players to experiences the real situation regarding environmental issues in 3D form. The integration of knowledge and electronic elements in the game helps to achieve the objective of the game where environmental awareness can be developed in a new and interesting way. These elements implemented in the board game is what differentiated Environess from other board game available in the market.

Impact on Education and Community

Environess Game consists of facts, acts and fine that had been implemented in real life so that the player could experience and understand the real situation and problem that arise on environmental issue. Not only getting knowledge, this game may help the players to practice their motor skills and influence their behavior and attitude on environment. Other than that, with low cost, teaching and learning session can be conducted in interactive way using electronic element AR and QR code, empowering the use of ICT during teaching and learning process, making the session enjoyable, fun and informative. The integration of facts and knowledge with the electronics element helps to improve the teaching and learning session by attracting the students to become more focus on the learning session and enable them to gain indirect knowledge through the game. Thus, the learning and teaching session can achieve the goals effectively. As a result, environmental awareness can be spread and helps the community to have a deeper understanding and knowledge towards environment.

Product Recognition and Potential Market

Since its launcing, Environess Game was registered its copyright under MyIPO (LY2020000913). The product also won several awards from different competition like gold medal in International Technology Exhibition (ITEX) 2020, gold medal in Minggu Penyelidikan & Inovasi for two years consecutively (2019 & 2020) and gold medal in UniSZA Carnival on e-Learning 2020. Besides, Environess Game also collaborated with different authorities and company. For example, State Government of Terengganu and AB Bakti Enterprise. It was identified that the potential market for this game is in wide range. This is because this game is suitable for all ages, from children to adult. This game is perfect for education purpose (between teachers and students), for relaxing game between family members and friends or even as a campaign tools for authorties body and NGO to promote environmental awareness. For the record, more than 100 sets of Environess Game had been sold through various platform, like academic institution, Sabasun Hypermarket and e-commerce platform Shopee.

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THE HAJJ CHRONICLES: APLIKASI TELEFON PINTAR GAMIFIKASI 3D BERASASKAN MANASIK HAJI

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Highlights: Pelaksaan ibadah Haji dan Umrah merupakan satu kewajipan mengikut kemampuan bagi setiap umat Islam dan diletakkan sebagai salah satu rukun Islam yang lima. Bagi mempersiapkan para jemaah Haji, kebanyakan negara Islam menyediakan satu kursus bimbingan haji dan umrah kepada para bakal jemaah. Kursus ini dijalankan dalam beberapa siri dan sebahagiannya tidak mampu untuk kefahaman yang jitu terhadap pelaksaan ibadah haji yang sedikit kompleks. Dengan kemajuan teknologi dan perkembangan gamifikasi, satu versi aplikasi telefon pintar 3D dibina bagi memudahkan pemahaman pemain berkaitan ibadah haji dan umrah dari segala peringkat umur. Pembinaan prototaip menjadi satu alternatif yang interaktif berasaskan gamifikasi 3D bagi membantu meningkatkan pemahaman ibadah haji. Selain itu, fokus kursus bimbingan umrah dan haji yang lebih kepada golongan dewasa dan tua dapat diperluaskan lagi kepada semua lapisan golongan.

Key words: Haji, gamifikasi, telefon pintar, manasik.

Introduction

Ibadah haji merupakan salah satu rukun Islam yang diwajibkan ke atas setiap umat Islam. Ibadah ini mempunyai beberapa aturan yang dikenali sebagai manasik haji yang bermula daripada niat sehingga kepada tahallul thani (kedua). Ibadah Haji dan umrah ini dilaksanakan di Makkah, Arab Saudi setiap tahun bermula bulan Syawal sehingga Zulkaedah.

Ibadah Haji merupakan satu ibadah yang berbentuk fizikal dan komplikated. Bagi mempersiapkan Jemaah haji, kerajaan Malaysia melalui Tabung Haji dan penyedia pelancongan Islam telah menawarkan kursus haji dan umrah yang dijalankan beberapa bulan pada setiap hujung minggu. Walau bagaimanapun, pelaksanaan kursus ini jelas tidak mampu menyelesaikan permasalahan kefahaman yang dihadapi oleh masyarakat Islam yang melaksanakan ibadah ini.

Pelaksanaan kursus haji dan umrah ini dijalankan secara teori dan amali. Pelaksanaannya dijalankan secara berkumpulan sekitar 100-300 orang setiap sesi. Selain itu, faktor usia dan penyampaian yang pelbagai menyebabkan terdapat sebilangan besar peserta tidak mampu memahami dengan jelas.

Atas premis ini, satu aplikasi mudah alih gamifikasi telah dibina sebagai satu alternative dalam mempelbagaikan bahan pengajaran berkaitan ibadah dalam Islam. Aplikasi ini memilih ibadah haji memandangkan ibadah ini lebih komplikated berbanding ibadah yang lain.

Aplikasi ini dibina secara 3D bagi memudahkan pemain untuk menggambarkan setiap daripada pelaksanaan ibadah ini. Aplikasi ini juga dimasukkan konsep istita'ah iaitu kemampuan pelbagai setiap peserta untuk memulakan sebuah perjalanan ibadah haji.

Memandangkan ibadah haji diwajibkan dan dimasukkan dalam silibus Pendidikan Islam dari peringkat rendah sehingga institusi pengajian tinggi, satu alternatif kepada pembelajaran tradisional perlu diperkenalkan. Bahkan, pembelajaran interaktif melalui gamifikasi telah diiktiraf berkesan dalam membantu pembelajaran para pelajar dari segenap peringkat.

Buat masa kini, masih belum terdapat mana-mana gamifikasi seumpama diperkenalkan. Ini menjadikan THC sebagai satu-satunya gamifikasi dalam bentuk 3D yang mengetengahkan ibadah Haji. Walaupun terdapat beberapa permainan papan yang telah diperkenalkan berkaitan ibadah haji, ianya tidak seteperinci gamifikasi ini.

Gamifikasi ini telah mendapat beberapa kolaborasi dengan pelbagai syarikat penyedia pelancongan Islam dalam memperkenalkan THC kepada Jemaah haji dan umrah.

mTASHEEL

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Highlights: Virus Korona atau Covid-19 yang mula merebak pada awal 2020 telah mengakibatkan berlakunya perubahan kepada mod pembelajaran di semua institusi pengajian daripada bersemuka kepada pembelajaran dalam talian. Kajian ini dijalankan untuk mengenal pasti keperluan pembangunan modul m-pembelajaran bahasa Arab peringkat asas dalam kalangan pelajar serta tahap penerimaan pelajar terhadap m-pembelajaran. Satu set soal selidik telah diedarkan kepada para responden untuk mengenal pasti keperluan pembangunan m-pembelajaran. Data yang diperolehi dianalisis menggunakan perisian SPSS dan diinterpretasi berdasarkan jumlah skor min dan sisihan piawai. Kajian mendapati bahawa para responden bersetuju untuk dibangunkan sebuah modul m-pembelajaran bahasa Arab peringkat asas dan bersikap positif untuk menggunakan teknologi yang terkini dalam proses pembelajaran. Kajian ini mencadangkan strategi dan aktiviti pembelajaran menerusi pembelajaran mudah alih (m-learning) yang boleh digunakan sepanjang pandemik ini bagi meneruskan sesi pengajaran dan pembelajaran dalam talian.

Kata kunci: m-pembelajaran; mTasheel; bahasa Arab permulaan; modul.

Pendahuluan

Penyebaran virus korona Sars (SARS-CoV-2) yang bermula dari Wuhan telah telah mengakibatkan situasi di seluruh dunia menjadi panik. Institusi pendidikan turut tidak terkecuali terkesan daripada penularan virus ini. Kebanyakkan institusi pendidikan di seluruh dunia dihentikan operasinya sementara waktu bagi membendung wabak ini. Maka bermulalah cabaran penggunaan pembelajaran jarak jauh sebagai medium alternatif kepada kebanyakkan institusi pendidikan di seluruh dunia.

Institusi pendidikan seperti sekolah, kolej dan universiti pada ketika ini masih mengamalkan konsep pembelajaran bersemuka sama ada dalam bilik kelas atau dewan kuliah. Meskipun terdapat usaha menggunakan teknologi dalam pembelajaran, akan tetapi pembelajaran secara bersemuka masih menjadi pilihan utama di kebanyakan institusi pendidikan. Namun, senario ini telah berubah apabila dunia dikejutkan dengan penularan wabak Covid-19 yang merbahaya. Lebih daripada 190 negara di dunia telah menutup operasi semua institusi pendidikan bagi membendung wabak ini daripada terus merebak ke dalam masyarakat (Basilaia & Kvavadze, 2020; Biswas, Roy, & Roy, 2020). Pertubuhan Kesihatan Dunia (WHO) telah melaporkan sehingga akhir April 2021, sebanyak 140,322,903 kes telah direkodkan. Manakala kes kematian akibat penularan wabak ini adalah sebanyak 3,003,794 kes yang melibatkan lebih 220 buah negara di dunia (World Health Organization, 2021).

Negara Malaysia juga tidak terkecuali dan turut terkena tempias akibat daripada pandemik yang merbahaya ini. Situasi yang meruncing ini telah membuatkan kerajaan Malaysia tiada pilihan lain kecuali terpaksa untuk menutup sementara semua institusi pendidikan yang ada bermula dari peringkat pra-sekolah sehinggalah ke institusi pengajian tinggi. Lantaran itu, mode pembelajaran secara

bersemuka tidak lagi boleh dipraktikkan antara guru dan para pelajar. Oleh itu, penggunaan pembelajaran secara dalam talian dan dalam bentuk mudah alih (m-pembelajaran) adalah merupakan alternatif yang terbaik untuk difikirkan pada masa ini. Semua institusi telah terkesan dengan pandemik ini dan mula beralih daripada menggunakan cara pengajaran secara tradisional (bersemuka dalam kelas) kepada cara baharu iaitu bersemuka dalam talian dari jarak jauh.

Kandungan

mTasheel merupakan satu modul yang dibangunkan dengan menggunakan pendekatan Kajian Rekabentuk dan Pembangunan *(Design and Development Research)* (DDR) (Richey & Klien, 2014). Pendekatan DDR melibatkan tiga fasa, iaitu fasa analisis keperluan, fasa reka bentuk dan pembangunan dan fasa penilaian kebolehgunaan. Proses reka bentuk dan pembangunan modul yang digunakan adalah bersandarkan kepada Model Pembinaan Modul Sidek (2001) dan *Instructional System Design (ISD) yang diadaptasi daripada model asal* (Tsai, Young, & Liang, 2005). Teori-teori pembelajaran bahasa juga dijadikan asas dalam proses tersebut.

Pembangunan mTasheel bermula dengan fasa analisis keperluan yang bertujuan untuk mendapatkan data tentang keperluan membangunkan m-pembelajaran bahasa Arab peringkat asas. Kemudian, hasil dapatan tersebut membawa kepada fasa reka bentuk dan pembangunan modul yang melibatkan pakar untuk proses penilaian dan kesahan. Akhir sekali, penilaian kebolehgunaan modul dilaksanakan terhadap pelajar yang terlibat.

mTasheel dapat diakses menerusi pelbagai jenis peranti seperti komputer desktop, komputer mudah alih (laptop), telefon pintar dan tablet.
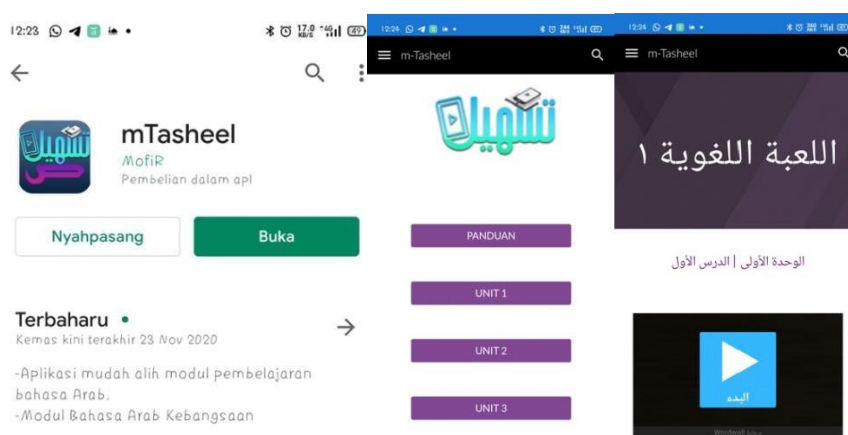
Rajah 1: mTasheel dalam Google Play Store dan telefon pintar

Rajah 2: mTasheel menerusi komputer.

Modul ini berpotensi digunakan oleh pelajar untuk mempelajari bahasa Arab secara kendiri dan dapat diakses menerusi peranti mudah alih seperti laptop, tablet dan telefon pintar pada bila-bila masa dan di mana sahaja.

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AUGMENTED REALITY TEACHER (AuReT)

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Highlights: This project is about Augmented Reality Teacher (AuReT) which strives to provide students with virtual courtroom. The impact of COVID-19 has greatly affected students at higher learning institution as well as their lecturers since all teaching and learning will be conducted in the online environment. For this reason, this project has come out with AuReT, the portmanteau for Augmented Reality Teacher that adopts Augmented Reality (AR) technology to virtualise real courtroom situation without the need of attending the courtroom.

Key words: *augmented reality, virtual, courtroom.*

Introduction

Teaching law subjects to freshman law students and non-law students at tertiary level is an uphill task for law lecturers, particularly in discussing the court system and the court hierarchy in Malaysia which is crucial in understanding almost all law papers. In the past, lecturers have organised educational visits to the nearest court complex so their students can physically experience and observe the daily operations and administration of justice in a courtroom. Nonetheless, the COVID-19 pandemic has disrupted the conventional method of teaching and learning process and has resulted in such an approach to be futile. This is due to the implementation of online class for all students at the higher institutions. Consequently, law lecturers need to come out with a novel idea in educating the first-year law students and non-law students as a viable alternative to the traditional approach. Augmented Reality is known as among technology pillars of industry 4.0 and had the ability to enhance real environment (Rayyan, 2020). For this reason, this project has developed AuReT (Augmented Reality Teacher) which enables the students to virtualise real courtroom situation without the need of attending the court complex or courtroom in person. It is observed that this new teaching and learning method can incite learning interest among the students during the subsistence of COVID-19 pandemic.

Objectives

Objectives of this project as below:

- To expose students, who are physically unable to be in the court complex due to the COVID-19 pandemic, to observe and experience a real scenario in the courtroom.
- To facilitate students in understanding court hierarchy and hearing process.
- To nurture positive learning experience among junior law students as well as non-law students in learning law subjects

Product Description

AuReT is an abbreviation from "Augmented Reality Teacher". It is an application designed with the purpose to enhance students' understanding of the courtroom structure in Malaysia. The project brings the courtroom into the classroom by using current technology, which is Augmented Reality (AR).

AuReT can be applied in face-to-face setting and online learning. The only students need to download the Assemblr apps and scan the QR code using their mobile phone. AuReT allows students to take a tour inside the courtroom from their classroom or from their home. Students can scan QR code provided by lecturer, and a 3D hologram will popup showing the courtroom structure. The technology makes learning more interactive, helping students to visualize the courtroom structure and understand the concept better. AuReT has been developed using virtual tour software and selected devices where the pictures of the courtroom were captured and arranged accordingly.

Product Novelty and Inventiveness

AuReT is a new technology and method used in law subject by implementing Augmented Reality via virtual learning. By using AuReT, it will provide environmental friendliness by reason of non-use of paper and can save travelling time and reduce monetary costs. Thus, it is fully utilized the Augmented Reality technology.

The market potential is for Higher Education Institution that offered any courses that required students to learn hierarchy of court eg: Malaysian Legal System, Business Law, Commercial Law, Industrial Relations and many others.

Usefulness & Application

AuReT will facilitate students in understanding court hearing process via virtual courtroom. By exposing students to real court room structure, AuReT will be able to increase positive learning experience of students in law subject. AuReT will greatly facilitate junior students at law schools and non-law students at other institutions of higher education who are required to enrol into law subjects such as Malaysian Legal System, Business Law, Commercial Law, Industrial Relations and many others. AuReT will be a viable alternative to educational visits to court complex as such visits will be almost impossible to be conducted during the subsistence of COVID-19 pandemic.

AuReT's underlying teaching principles are active learning, self-learning and collaborative learning. In enhancing active learning, AuReT promotes hands-on where students can explore the application using their own devices. By having virtual courtroom, students will be prompted to ask question and this can boost their excitement in learning law subjects. AuReT will also encourage self-learning as students can view the courtroom at their own pace especially for revision purpose. In addition, AuRet can boost students collaborative learning since they can discuss with other students on the courtroom structure. The process is below:

Process of using AuReT
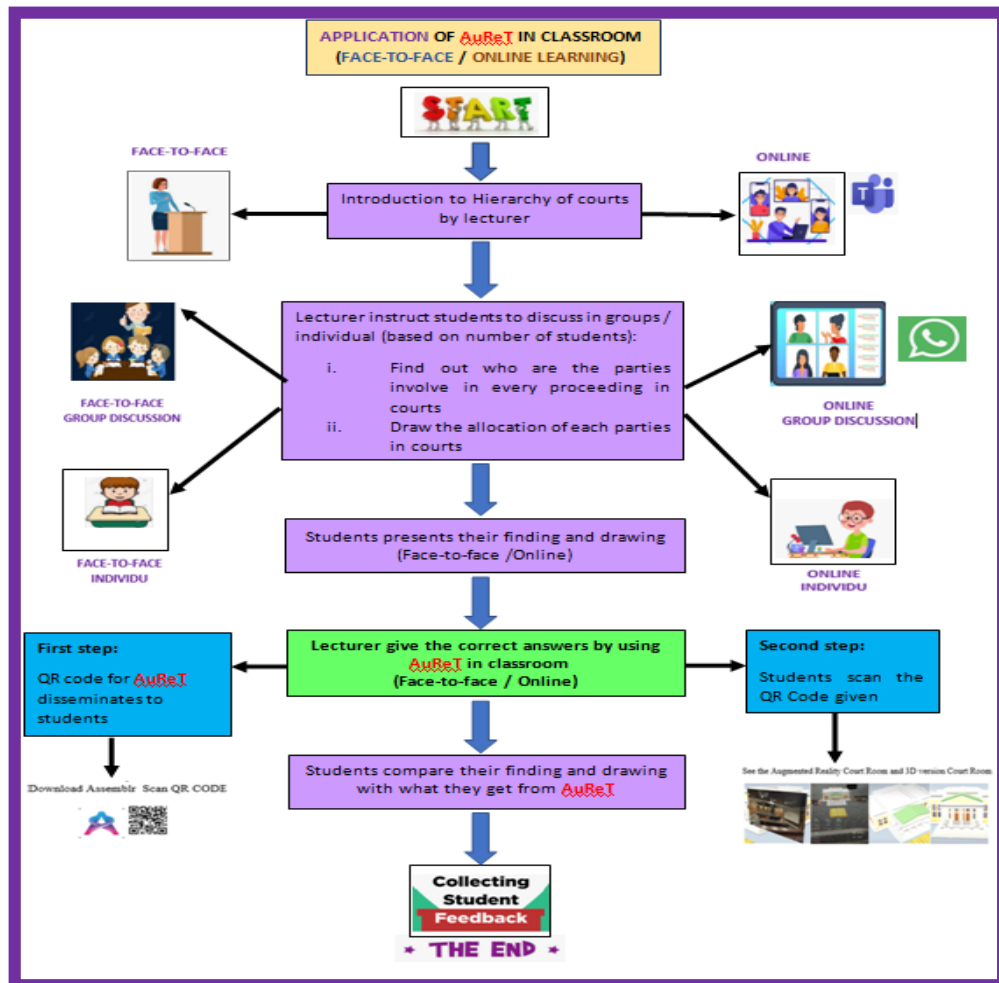
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ELECTRICO

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Highlights: Understanding of electric topic by student in learning experiences is highly idiosyncratic and commonly in conflict with the conceptions of Physics. In order to overcome this problem, an innovative board game namely Electrico is designed to provide both fun and learning by facilitating the learning of Physics and mainly focus on electricity. The objective of this game board is to introduce the player to the basic and enhance their understanding on electric topic. The game set consists of dice, electric component, set of questions, buying-trading money and it needs at least two players. The interactive this game included hands-on arrangement component on circuit and embedment of AR. This educative game would inculcate interest in electricity among student and has a potential to be patented and commercialized.

Key words: physics; educational; board game; electric; circuit; AR

Introduction

Electric had always had this reputation and stigma that were labelled as hard and challenging in the mind of the students [1]. Especially those who just step into this particular subtopic in Physics [2,3]. This indirectly demotivated the student to actually dig in deeper into electric topic. To tackle this issue, an invention named Electrico is introduced as an alternative way as a fun learning-based physics board game that cover the basic of a specific subtopic of physics which is electric topic. Electrico is an educational innovation specifically designed in the form of a board game, built to attract students to understand the basic concept of electricity. Educational games provide a fun way to students for learn and review any topics in inside or outside classroom and made up games engage students in creative ways encouraging joy in learning. Ideas inspired by students complaining that the topic of electricity is difficult to understand. Its functionality is to create another medium of learning that are less formal and a lot more fun compared to the traditional learning process. Electrico are able to expand and diversify the method of delivery of electric topics and become one of the best mechanisms to improve basic electrical knowledge. Indirectly are able to change students' negative perceptions on Physics, particularly electric topics. The Electrico board game is also can keep the players of our games to go off gadget as it has negative effects on health. The objectives of this board game is to create an educational game that can enhance student's learning ability. Additionally, it also to explore student's interest and attitude towards the usage of games as educational tools. Lastly, is to investigate the impact of Electrico on student's understanding and attainments. This game also promotes energy saving, and expose players to the appreciation of electricity. Subsequently, the cost of electricity consumption in homes and premises can be reduced. In addition, this game creates awareness and informs the players on short circuits to avoid the occurrence of accidents at home. Electrico aims to serve as a tool for

teaching and education among school students, university students, and the general public as learning through play is one of the effective ways to attract students, especially children.

Content

Electrico has almost the same concept as other commercial games but it has been modified and innovated by adding electricity related questions in the game play. The game set consists of dice, electric component, and set of questions in various difficulty, buying-trading money and circuit component. The game start with the players roll the dice and move the checkers then the players need to answer the question according to 3 levels. Questions are prepared according to 3 levels; easy, medium and hard. Each questions need to be answered in each round to get coins to purchase electrical components. Players will compete to buy diodes, capacitors and resistors, similar to the concept of buying assets such as houses and hotels in other board games. In addition, the players need to know the function of each component. The game focuses on testing the knowledge and comprehension of basic electrical components, their functions, formulas and calculations in electrical topics. The players then need to install a simple circuit using the successfully purchased components. The player who completes the circuit first wins. The game board is designed with many attractive colours in order to attract the students' interest to play it especially who choose the science stream so that they can learn basic electric to make it easy in learning electric topic. This game needs at least two players and also included hands-on arrangement component on circuit. Players advance to answer electric related questions from the game cards and complete to become a winner.

Electrico is not only benefit to teachers and high school students only, but also to whom seeking knowledge about electric and for family that wanted to spend time together while gaining more knowledge. Through this game, player can get basic information about electric and expand their knowledge. The benefit of this product is portable, easy to play and user friendly. By adding augmented reality in the sets of questions make players more exciting to play and encourage them to fits in digital world. It also to culminate an enjoyable learning experience as students can face the challenges of the Industrial Resolution 4.0.

According to our survey and data collected where the total of 136 respondents that consist of 76 % female followed by another 24 % male regarding the engagement of physics in their lives. A total of 67.2% chooses Electric as the subtopic they find challenging in physics. Moreover, a total of 45 respondent wish that they need better understanding on this topic. Entailing that we also asked their opinion on why they think that particular subtopic is challenging. Electric is particularly hard because it is not something that student is familiar with and its concept and theory does not intertwine with students' daily life [3]. The survey finding that the concepts of electricity are particularly problematic these are highly abstract and complex in ways that make their understanding both centrally dependant on analogies and metaphors and frequently problematic. Study shows impact of games or simulation with regard to achieving specific learning objectives are rather promising. Survey state that 80 % agree the electric board games can attract their interest to explore electricity topics while 90 % stated that this product makes it easier for them to apply the theory regarding short circuits through its hands-on element. This product is invented especially for high school and university student to enhance the interest of them in learning physics especially electric since this topic is crucial. This game also can help teachers and lecturers in innovative teaching and learning and make students more understand in electric and make the learning process become more fun and entertaining in the class.

For commercialization, Electrico is making its way to the market which collaborated with Redox RX Enterprise Company based in Terengganu. This company will help us to mass produce the products in the future. Target users are focused on students, teachers and even parents, to bring variety to indoor games for their children. The game involves installation of electrical components in a simple circuit, which differs with normal commercial games in the market that only involve questions and answers. This makes this game unique and interesting. Figure 1 shows the board game and sets of components

in playing the game. The box was designed with infinity mirror, which fits with the electrical concept will be the main interest for the marketing target. Electrico are affordable game that not only schools can use it but also for families. Therefore, this product also can be commercialized to the book store and game store since it is beneficial, portable and user friendly.
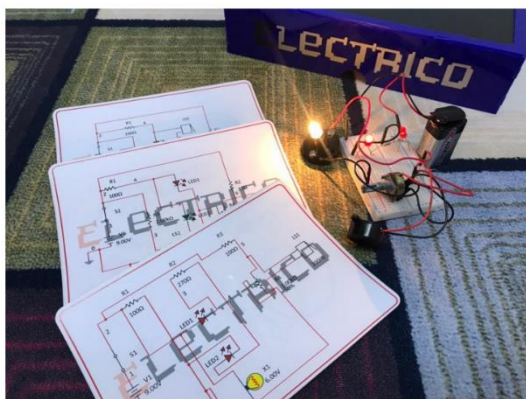
Figure 1: Electrico Set

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A FAIR ASSESSMENT OF SOFT SKILLS: AN INTEGRATION OF PEER EVALUATION AND TECHNOLOGY DURING PANDEMIC

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Highlights: The university's expectations of student-centred learning pose a significant challenge in designing a fair assessment of soft skills for larger classes. This is even made worst by the current Covid-19 pandemic because teaching and learning forced to happen online. This work aims to evaluate the feasibility of using technology (i.e. Google Form) and peer evaluation to perform an impartial soft skill assessment. The study involved 121, 111 and 100 students from year 1, 3 and 4, respectively, of Bachelor of Pharmacy, USM. We found no significant difference in the soft skills between the different years, yet the study evident that the peer assessment coupled with technology could be a tool for fair soft skills evaluation of larger classrooms.

Key words: Technology; Peer evaluation; Soft skills; Google Form; Laboratory; Clerkship

Introduction

In this era of technology, the student cohort is becoming more diverse, and the number of students in a class is increasing. Enrolment of more than 100 students per class is becoming more common. Consequently, it poses a great challenge for a fair assessment of soft skills for these larger classes (Parumasivam & Yee, 2018). The individual assessment by the lecturer also may not be the true appraisal of the students due to the laborious and time-consuming procedure. In addition, the current Covid-19 pandemic has raised a significant challenge in the assessment of student's soft skills in the higher institution due to online teaching and learning.

"For teachers, as for students, the most effective evaluation comes from someone who sits beside us and helps us grow" – Carol Ann Tomlinson, educator and author.

When a teacher or lecturer evaluate a student's soft skills, the outcome of the evaluation is only based on the limited time contact between them. Hence, the evaluation may not reflect the "true performance" of the student. Alternatively, peer assessment could be a potential approach to overcome this drawback of the conventional evaluation system.

Although peer evaluation is not something new in tertiary education, this assessment method has not been widely applied due to the heavy workload and tedious processes despite its high value of reliability. Thus, the incorporation of technology (i.e. Google Form) is an alternative to ease the assessment procedure as well as analysis of the outcome for grading purposes. The e-analysis can be done in a few minutes by the educators as compared to the conventional way of using hard copy

materials which may take weeks for compilation, keying-in the raw data and analysis. In addition, this approach aligns with generation Z, who are digital natives or tech-savvy.

Content

Various subjects from Bachelor of Pharmacy, USM that are involving group activity were chosen for this study:
i. Year 1, Microbiology for Pharmacy, 121 students enrolled
ii. Year 3, Biopharmaceutics and Pharmacokinetics, 111 students enrolled
iii. Year 4, Hospital clerkship, 100 students enrolled

The student groups were consisting of mixed genders and races. After a group lab session (year 1 and 3) or clerkship (year 4), the students were requested to evaluate their group members through a Likert scale and open-ended question using a Google form. The components being assessed including punctuality, communication, teamwork, leadership, time management and ethics. The evaluation criterion was set based on a current requirement of the Lembaga Farmasi (Malaysian Qualifications Agency, 2015) and Malaysian Blueprint 2015-2025 (higher education) (Ministry of Higher Education Malaysia, 2015). The questions also align with our previous preliminary survey to the stakeholder regarding the value needed in the current graduate. Students were also given a questionnaire to get their feedback on the peer evaluation of their soft skills.

It was found that the students' soft skills are above average from the perspective of their peers regardless of the year (Figure 1). It is also interesting to know that leadership is the only soft skill that has a significant positive correlation with academic performance as compared to other skills.
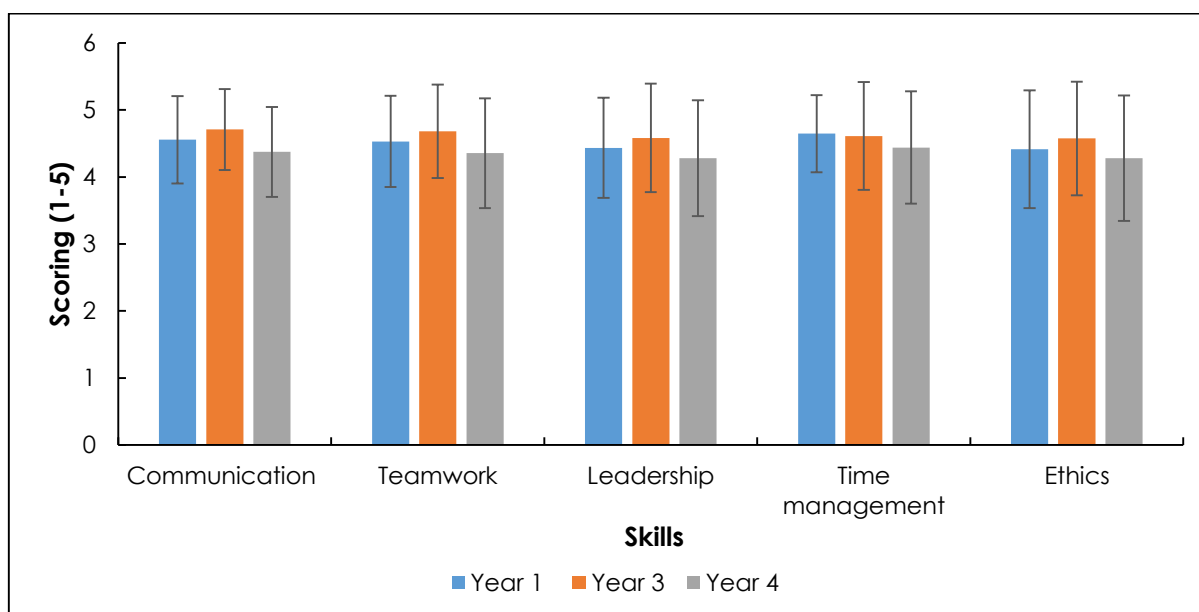
Figure 1. The outcome of the soft-skill assessment of year 1, 3 and 4 via peer evaluation. The scoring scale was presented as 1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree and 5 for strongly disagree.

In term of student acceptance, Year 1 showed a significantly higher percentage of acceptance compared to year 3 and 4 (Table 1). Further studies are being carried out to investigate the rationale for this scenario.

Table 1. Percentage of acceptance by students towards the soft-skill evaluation through the peer evaluation.

Year	Yes (%)	No (%)
Year 1	86.4	13.6
Year 3	44.0	56.0
Year 4	46.8	53.2

Based on the timestamp of the data collected, the peer assessment results could be collected easily within a short timeframe. As the generated result was in the form of an excel sheet, the compilation and analysis were done in a day. Hence, this showed that the technology integrated peer evaluation is feasible in which the peer assessment result was captured automatically. It is also a sustainable approach compared to the conventional hard copy methods and saves time keying in the individual assessment. The study does not have any commercial value. The Google Form questionnaires have been copyrighted.

To the best of our knowledge, no peer evaluation work has been published as a tool for assessment for learning in pharmaceutical classrooms which are: (i) laboratory practical and (ii) pharmacy clerkship. Hence, this study would be one of the pioneers to investigate the feasibility of peer assessment in the pharmacy-related classroom.

In conclusion, this innovation has undeniable time and cost-effectiveness catering to the current education phenomenon of scarce resources, laborious workload and limited face-to-face contact.

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APLIKASI I-KASIH (INFORMASI KASIH) DALAM PEMULIHAN KETAGIHAN DADAH

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Highlights: Modul i-Kasih bertujuan menggerakkan keluarga dalam pemulihan ketagihan dadah. Modul berteraskan kerohanian dilaksanakan ke atas 181 orang informan di negeri Terengganu, mendapati kekangan ialah pengetahuan dan komitmen. Aplikasi *informasi Kasih* (i-Kasih) merupakan idea untuk mengatasi kekangan komitmen, menerusi modul lebih mesra pengguna. Tiga unit kandungan aplikasi: (i) Indikator Keluarga Sejahtera, (ii) Kenali Dadah, (iii) Doa Rawatan ini menepati kaedah pembelajaran digital kepada keluarga khususnya dan komuniti umumnya. Menerusi aplikasi ini, keluarga boleh menyemak kriteria keluarga sejahtera, input bergambar jenis dan kesan dadah serta audio bacaan doa amalan dan rawatan. Aplikasi ini berpotensi dimanfaatkan kepada komuniti seperti pengurusan komuniti dan sekolah sebagai bahan pendidikan digital.

Key words: Aplikasi Informasi Kasih, Pemulihan Dadah, Keluarga Penagih, Kerohanian, Modul Pemulihan, Dadah

Pengenalan

Modul i-Kasih merupakan modul pemulihan ketagihan dadah, dengan keluarga sebagai penggerak utama dalam membantu pemulihan dadah. Modul ini mengandungi enam (6) unit dibina berdasarkan kajian yang dilakukan ke atas 181 orang responden, terdiri daripada ahli keluarga penagih opiat di negeri Terengganu. Modul ini menekankan elemen kerohanian sebagai teras utama, telah diuji di lapangan ke atas tiga (3) kumpulan keluarga berbeza. Hasilnya didapati keluarga bukan hanya mempunyai kekangan dalam pengetahuan, malah komitmen dalam membantu penagih. Aplikasi *informasi Kasih* (i-Kasih) merupakan cetusan idea membawa modul ke dalam keluarga, bertindak sebagai panduan lebih mesra pengguna khusus untuk mengatasi kekangan komitmen. Aplikasi *informasi Kasih* (i-Kasih) mengandungi tiga (3) unit kandungan iaitu: (i) Indikator Keluarga Sejahtera, (ii) Kenali Dadah serta (iii) Doa Rawatan. Aplikasi ini menepati kaedah pembelajaran digital kepada keluarga khususnya dan komuniti umumnya. Menerusi Aplikasi *informasi Kasih* (i-Kasih), keluarga boleh menyemak kriteria keluarga sejahtera menerusi soal selidik, input bergambar jenis dan kesan dadah serta audio bacaan doa amalan dan rawatan untuk diamalkan dalam keluarga. Aplikasi ini berpotensi dikembangkan kepada komuniti umum seperti pengurusan komuniti dan sekolah sebagai bahan pendidikan digital.

Aplikasi informasi Kasih (i-Kasih)

Aplikasi informasi Kasih ini adalah bertujuan untuk menerapkan modul i-Kasih keluarga mempunyai ahli keluarga yang terlibat dengan masalah dadah secara maya. mendedahkan informasi bersifat mudah akses dalam platform digital kepada keluarga yang mempunyai ahli keluarga yang terlibat dengan dadah (iii) memenuhi keperluan keluarga dalam membantu pemulihan ketagihan dadah dalam kalangan ahli keluarga serta (iv) membantu keluarga mengatasi kekangan komitmen dalam proses

pemilihan dadah. Aplikasi informasi Kasih ini penting kerana menekankan penglibatan aktif kumpulan sasar iaitu keluarga penagih dalam masa pengendalian modul. Pendekatan yang digunakan bagi tujuan pendidikan adalah pembelajaran informal di mana keluarga atau pengguna aplikasi ini akan dapat belajar secara langsung dengan penggunaan aplikasi ini. Sementara refleksi pula membolehkan keluarga merenung kembali pengalaman mengurus penagih yang dihadapi dan implikasi terhadap mereka.

Aplikasi informasi kasih dibina berdasarkan maklum balas keluarga semasa pelaksanaan modul di lapangan. Oleh itu, aplikasi ini mempunyai impak lebih berkesan dengan tambahan inovasi doa menjadikan ia lebih bersifat holistik melibatkan jasmani, emosi dan spiritual. Audio bacaan doa amalan disertakan bersama pula bertujuan untuk membantu keluarga yang mempunyai masalah untuk membaca jawi dan arab. Bagi tujuan komersial, aplikasi informasi kasih berpotensi digunakan di sekolah sebagai bahan pendidikan secara maya kepada sekolah bagi menyokong kempen pencegahan ketagihan dadah di peringkat kanak-kanak dan remaja. Aplikasi informasi kasih juga boleh dimanfaatkan orang awam sebagai sumber pengetahuan dan rujukan terutama dalam mengenali jenis dan kesan dadah bagi tujuan pencegahan di peringkat komuniti.

SMOKING RISKS AWARENESS (SMOKE-NOT-KING V2.0)

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Highlights: Smoking Risks Awareness (Smoke-Not-King v2.0) is one of the board games created to increase the development knowledge and information especially among communities. As addition, this innovation emphasizes more about smoking awareness and the recommended solutions on quitting smoking. The Acts, fines and campaigns are provided in the form of games in this product that can make players are more likely to remember and thus influence good attitudes in avoiding smoking.. With low cost, players can get information while also change the perspectives on smoking risks awareness and consequently affecting their own attitudes.

Key words: *Smoking Risks, Awareness, Board Game*

Introduction

Smoking become an issue and this behavior does not only involved among adult but also teenagers. The number of smokers is increasing day by day and this situation is very worrying for all parties, especially parents who have teenagers that are easily affected by these negative symptoms. According to Global Malaysia Tobacco Tobacco (GATS) study conducted in 2011, the number of smokers aged 15 years and over was 23.1% or 4.7 million people.

Epidemics caused by cigarettes have followed the norm of smoking. The scientific knowledge of active tobacco hazard effects has accumulated in the last 60 years since the initial explanation of increased lung cancer. The increase in lung cancer was first studied in the 1920s and 1930s by pathologists and other medical practitioners (Winstanley et al., 1995). Various facts are derived from past studies that have revealed that most adolescents who smoke easily participate in smoking activities are due to the possibility of their partners being made up of hardcore smokers (Weinstein et al.,2013).

Product development background

Understanding the social work students role in adopting a recovery perspective, including identify strategies to promote recovery and care on smoking behavior. This innovation continue to be used in my course, CWS 30202 Recovery and Care on Social Work, this innovation most relevant to my curriculum because this course looks to the process of recovery includes a process of refining oneself, learning to accept one's vulnerabilities, overcoming stigma and discrimination among people who are smoking tobacco.

Focusing on processes that promote critical thinking, problem solving, and effective decision-making skills. Education utilizes processes that involve students in observing, measuring, classifying, experimenting, and other data gathering techniques. These processes assist students in discussing, inferring, predicting, and interpreting data about smoking issues. As a result, individuals develop a deeper understanding of smoking issues and have the skills to make informed and responsible decisions. These experiences help students to develop sense of responsibility to take care of the people who are at risk in smoking behavior.

Research studies show that board games such as Snakes and Ladder result in children showing significant improvements in aspects of basic number skills such as counting, recognizing numbers, numerical estimation and number comprehension. They also practice fine motor skills each time they grasp a game piece. In order to enhance the innovative element in the product, QR Code and Augmented Reality (AR) technology has been installed, adding a layer of digital information to make it more interactive and interactive, suitable with IR 4.0 era.

Product Innovativeness

Smoking Risks Awareness (Smoke-Not-King v2.0) is a board game that consists of materials like moving tokens, dice, cards, chances and penalty. Despites its features, is not similar to the typical board game available in the market. Smoke-Not-King v2.0 itself focusing on the smoking tobacco aspect where real acts, fines and issue was implemented in the game. The board game was upgraded to another level by adding the digital elements like QR Code and Augmented Reality (AR). A set of questionnaires was prepared to measure the level of knowledge among players before and after the games. This set of questionnaires can be accessed by scanning the QR Code available in the Smoke-Not-King v2.0 board game.

Impact on Education and Community

Consists of facts, acts and fine that had been implemented in real life so that the player could experience and understand the real situation and problem that arise on smoking issue. This game may help the players to practice their motor skills and influence their behavior and attitude on health issue related to smoking cigarette. Other than that, with low cost, teaching and learning session can be conducted in interactive way using electronic element AR and QR code, empowering the use of ICT during teaching and learning process, making the session enjoyable, fun and informative. The integration of facts and knowledge with the electronics element helps to improve the teaching and learning session by attracting the students to become more focus on the learning session and enable them to gain indirect knowledge through the game. As a result, it's can be spread and helps the community to have a deeper understanding, knowledge towards healthy life and support to help smokers quitting smoking behavior.

Product Recognition and Potential Market

Since its launcing, Smoking Risks Awareness (Smoke-Not-King v2.0) Game was registered its copyright under MyIPO myIPO: (LY2020000743). The product also won several awards from different competition like gold medal in International Technology Exhibition (ITEX) 2020, gold medal in Minggu Penyelidikan & Inovasi (MPI) 2019, 2020 and gold medal in UniSZA Carnival on e-Learning 2020. Letter of Intent from V3X Malaysia Sdn Bhd to offer support in terms of possibility for further enhancing the product to be market ready for commercial use and collaborated with different authorities for example, one's NGO related to smoking risk awareness. It was identified that the potential market for this game is in wide range. This is because this game is suitable for all ages, from children to adult. This game is perfect for education purpose (between teachers and students), for relaxing game between family members and friends or even as a campaign tools for authorties body and NGO to promote smoking risk awareness. For the record, more than 40 sets of Smoking Risks Awareness (Smoke-Not-King v2.0) Game had been sold through various platform, like participation in national and state level health program exhibitions as well as in academic institution and schools.

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VOICE OUT! 2.0 VIRTUAL GUIDE TO SPEECH PRESENTATION

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Highlights: It is a contemporary English book introduced to amplify the learners' learning abilities to perform a better speech presentation through ways of technological enhanced experience. **Voice Out! 2.0 Virtual Guide to Speech Presentation** is an Augmented Reality (AR) application designed to connect the digital world to the personalised experiences of the users. Tailored to enhance users' learning experience, the application is developed according to the learners' preferences; fun and easy to follow contents and real-people demonstrations. This certainly provides added-values to the interactional learning experience. Virtual Reality (VR), another technology booster, gives users a simulation-based learning experience. Ultimately, interacting with AR mobile apps and enjoying real-time simulation through VR headset would beautify the learners' immersive learning experience while traditionally flipping the book. Any types of learners, from intrapersonal to the tactile learners, are now ready to enter the virtual world and set to becoming a better speech English presenter.

Keywords: Mobile Apps, Technology, Teaching and Learning, English Second Language (ESL), Augmented Reality (AR), Virtual Reality (VR)

Introduction

Voice Out! 2.0 Virtual Guide to Speech Presentation is an English-Speaking book aimed to help English Second Language (ESL) learners at tertiary level as well as professional levels from any backgrounds to overcome common problems in delivering presentations. This book is an upgraded version of Voice Out! Virtual Guide to Speech Presentation with the addition of both the AR and VR applications in creating an immersive learning experience. This mixed reality technology English speaking module is an approach to engage the language learners into a realistic communication environment as well as a tool to help language teachers to visualize their teaching concepts being taught in textbooks and videos.

This product was initiated as an attempt to enhance the process of learning on English Language Speaking Skill aligned to the rising trend of Industrial Revolution (IR 4.0) which has also catapulted the advancement of Education 4.0. Education 4.0 has brought forward new concepts and ideas in educational technology and the stress on the student-centered learning. With this in mind, Department of Language, Centre for Fundamental Studies, UniSZA, decided to introduce AR and VR technology in the learning process of English Language Skills through this product. With the help of Voice Out! 2.0 module, students will be able to take charge of their own learning process and gain access to information beyond the limited words printed on the pages of the module itself. AR and VR implementation within the Voice Out! 2.0 module acts as a gateway for the module users to get extra information in the form of explanations of concepts, demonstration and visualization of ideas and also speaking practices.

In the era of digital devices, educators have an opportunity to enable better learning with technology. AR and VR technology seems to be the natural next step for the evolution of education. Virtual reality can be used to enhance students' learning and engagement as it provides an immersive experience. AR and VR education can transform the way educational content is delivered; from the traditional classroom lectures to virtual world interaction. Being immersed in what students are learning, it will motivate them to fully understand the learning content. This is in line with the mission of the Ministry of Higher Education to sustain the higher education system in order to develop and enhance individual potential and fulfil Malaysia's aspiration.

In unveiling the advantages of this 'hybrid' book innovation – combination of traditional and technology blended in reading method - this product has shifted the students' learning experience into a new dimension. To increase the motivation for lifelong learning and to encourage the learning interest among the students are the benefits that this innovation has served. Initially developed with AR, our product has received many positive responses and feedbacks from the students (Refer to Table 1). 300 undergraduates from UniSZA had been involved in the research survey on the effectiveness of AR in speaking skills through the use of SmARtbook module.

Table 1: Effectiveness of AR usage in learning speaking skills

Item	Mean
AR content helps to better understand the topics	3.9529
AR content provides additional information which are not printed in the textbook	3.9293
AR content provides additional information which are not taught in class	3.8889
AR content encourages me to apply the provided knowledge	4.0168

To expand and widen the value, this product has added a new technology, which is VR, as an enhancement to the virtual reality learning experience in learning the language (English). Started since 2019, the process for this innovation has gradually improved its content and delivery to provide a high-quality product and reach potential to the community as a whole, fulfilling the demand and suiting all levels.

Not just a common traditional textbook, this book comes with an application (VoiceOut) available on Google Play Store and ready to be downloaded by learners for an engaging simulation-based learning experience in delivering speech presentation. The AR and VR contents are the value-adding components compared to other English-speaking books/ modules to meet the demands of the 21st Century Learning Skills and provide opportunities for learners of all levels to keep up with the lightning-pace of today's teaching and learning approaches.

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i-KoBA: PERISIAN KURSUS PEMBELAJARAN KOSA KATA BAHASA ARAB

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Highlights: Pembelajaran kosa kata Bahasa Arab sememangnya dianggap mudah bagi pelajar yang mempunyai asas mengenal huruf, bunyi dan makna perkataan, namun terdapat sedikit kesukaran bagi pelajar yang tidak mempunyai asas tersebut. Perisian kursus Pembelajaran Kosa Kata Bahasa Arab (i-KoBA) dibangunkan dalam usaha memudahkan kefahaman dan menarik minat pelajar untuk mempelajari, memahami seterusnya menguasai kosa kata Bahasa Arab. Kandungan perisian kursus ini meliputi topik yang telah digariskan dalam Dokumen Standard Kurikulum dan Pentaksiran (DSKP) Bahasa Arab tahun 4 sekolah rendah. Pendekatan yang digunakan dalam perisian kursus ini adalah belajar melalui 'lihat, dengar dan tiru' dengan menggabungkan elemen multimedia interaktif iaitu audio, video, grafik, teks dan animasi. Perisian kursus i-KoBA ini boleh diakses secara dalam talian.

Key words: perisian kursus; kosa kata Bahasa Arab; elemen multimedia; interaktif.

Introduction

Proses pembelajaran yang hanya melibatkan syarahan menggunakan buku teks, peruntukan masa pembelajaran di dalam kelas yang terhad dan jumlah pelajar yang ramai dalam kelas sering dilihat sebagai cabaran kepada guru dan pelajar bagi mewujudkan suasana pembelajaran yang menarik dan efektif. Melihat kepada situasi tersebut, satu perisian kursus pembelajaran kosa kata Bahasa Arab yang lengkap perlu dibangunkan. Selari dengan perubahan dalam kaedah mengakses maklumat yang mempengaruhi format penyampaian maklumat untuk generasi abad ke-21 atau generasi digital, sumber pengetahuan visual dengan teks yang ringkas lebih disukai dan menjadi pilihan pelajar dan orang ramai (Ghode, 2012). Ditambah pula dengan bahan multimedia interaktif yang mempunyai visual grafik, teks, muzik, video serta animasi, kesemuanya dilihat mampu meningkatkan kadar penerimaan pelajar mengenai sesuatu bahan yang diajar dengan anggaran sebanyak 30% lebih daripada pelajar yang menggunakan kaedah pembelajaran tradisional (Baharuddin et. al, 2003).

Justeru, satu perisian kursus pembelajaran kosa kata Bahasa Arab dibangunkan dinamakan i-KoBA. Perisian kursus ini merupakan bahan alternatif untuk membantu murid dalam menghimpunkan sejumlah besar perbendaharaan kata yang dipelajari dengan bantuan persembahan elemen multimedia, memahami maksud kosa kata yang dipelajari dengan latih tubi yang disediakan serta dapat mengingat kosa kata yang dipelajari dengan ulangan.

Content

Perisian kursus i-KoBA direka khusus untuk pelajar sekolah rendah mempelajari kosa kata bahasa Arab. Ia dihasilkan dalam bentuk perisian kursus atau koswer sebagai bahan bantuan dalam pembelajaran kosa kata Bahasa Arab.

Perisian kursus i-KoBA merupakan satu perisian kursus yang menggunakan pendekatan Kajian Rekabentuk dan Pembangunan *(Design and Development Research)*(DDR)(Richey & Klein, 2007). Pendekatan DDR melibatkan tiga fasa, iaitu fasa analisis keperluan, fasa reka bentuk dan pembangunan dan fasa penilaian kebolehgunaan. Proses reka bentuk dan pembangunan perisian kursus yang digunakan adalah bersandarkan kepada Model ADDIE (1987) dan Prinsip Pembelajaran Multimedia Mayer (2001). Teori-teori pembelajaran bahasa juga dijadikan asas dalam proses pembangunan perisian tersebut. Kandungan perisian kursus ini meliputi topik yang telah digariskan dalam Dokumen Standard Kurikulum dan Pentaksiran (DSKP) Bahasa Arab tahun 4 sekolah rendah di Malaysia.

Pembangunan perisian kursus i-KoBA bermula dengan fasa analisis keperluan yang bertujuan untuk mendapatkan data tentang keperluan membangunkan perisian kursus pembelajaran kosa kata Bahasa Arab. Kemudian, hasil dapatan tersebut membawa kepada fasa reka bentuk dan pembangunan perisian kursus yang melibatkan pakar untuk proses penilaian dan kesahan. Akhir sekali, penilaian kebolehgunaan perisian kursus dilaksanakan terhadap pelajar yang terlibat.

Persisian ini lebih bersifat edutainment (pembelajaran secara berhibur) supaya pelajar dapat mempelajari bahasa Arab dalam persekitaran yang santai dan menyeronokkan.

Pendekatan yang digunakan dalam perisian kursus ini adalah belajar melalui 'lihat, dengar dan tiru' dengan menggabungkan elemen multimedia iaitu audio, video, grafik, teks dan animasi. Pembelajaran kosa kata bahasa Arab melalui elemen multimedia ini membantu menjadikan pembelajaran lebih berkesan dan mempercepat proses pemahaman dan mengekalkan maklumat untuk tempoh yang lebih lama selain meningkatkan kemahiran mendengar dan bertutur dalam kalangan pelajar. Di samping itu, ianya juga dapat memupuk minat pelajar terhadap bahasa Arab dan membangkitkan persekitaran pembelajaran yang sangat baik sesuai dengan teknologi moden. Pembangunan perisian kursus i-KoBA meraikan generasi Alpha yang lebih tertarik kepada penggunaan teknologi dan pembelajaran secara maya. Perisian yang komprehensif ini mengandungi bahan pembelajaran, aktiviti, latihan, permainan Bahasa dan kamus.

Perisian khusus i-KoBA amat sesuai untuk pelajar dan mereka yang ingin mempelajari bahasa Arab secara amnya. Ia membantu dan memberikan pemahaman yang jelas tentang proses pembelajaran kosa kata bahasa Arab dan menggalakkan pembelajaran bebas atau pembelajaran secara kendiri dalam kalangan pelajar. Pembelajaran secara kendiri ini amat sesuai terutamanya ketika situasi pandemik Covid-19 sekarang.

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GLOBAL UMRAHAJI GAME (GUG)

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Highlights: Global UmraHaji Game (GUG) is introduced using the concept of gamification to increase understanding and knowledge of the method of performing umrah and hajj in detail to the community as early as childhood. In addition, GUG is also a scientific board game with umrah and hajj theme to apply the concept of entertaining and interactive learning (fun learning) in umrah and hajj worship education, GUG also can be used as a teaching aid in Islamic education at school and at the same time can strengthen the relationship with each other. GUG is divided into two versions; the physical version and the digital version.

Key words: *Global UmraHaji Game (GUG), gamification, umrah, hajj, fun learning, education*

Introduction

The performance of Umrah and Hajj requires a clear understanding in terms of the pillars, obligatory, things that are prohibited during ihram and the ways of performing umrah and hajj. However, the community and students still do not have enough knowledge about the correct method of performing umrah and hajj and do not even understand and deepen the method of performing umrah and hajj as well as possible. Therefore, the community and students need to be given good preparation and picture of the situation and implementation of umrah and hajj itself. The community and students need to acquire sufficient knowledge to be able to be a guide when performing umrah and hajj. Thus, the Global UmraHaji Game (GUG) was introduced using the concept of gamification to increase the understanding and knowledge of the methods of performing umrah and hajj in detail to the community and students as early as childhood. The main purpose of this game is to provide education to the community, especially primary and secondary school students and Muslims in Malaysia in particular. The advantage and uniqueness of this product is because it is based on the syllabus of Islamic education

subjects based on the Secondary School Standard Curriculum (KSSM), Primary School Standard Curriculum (KSSR), Islamic Shariah Education Syllabus form 4, KAFA Year 6 Ibadah Subject and Hajj Book, Umrah and Ziarah issued by Tabung Haji. GUG is divided into two versions, the physical version and the digital version. The physical version is in the form of a game board and the use of dice and cards. While the digital version is in the form of games using mobile gaming applications and Augmented Reality (AR) applications. GUG also serves as a teaching aid for Islamic education subjects and training materials for mutawwif courses and hajj courses implemented by relevant agencies. GUG is believed to be able to increase the knowledge and understanding of the community and students on the importance of performing umrah and hajj correctly and perfectly.

VERSION	PRODUCT
PHYSICAL VERSION	**1) BOARD GAME**
DIGITAL VERSION	**1) MOBILE GAME APPLICATION**

2) AUGMENTED REALITY (AR) APPLICATION

Content:

GUG is built based on the Secondary School Standard Curriculum (KSSM) for the subjects of Islamic Education and Islamic Shariah Education form 4 as well as the book of Question and Answer of Ibadah Haji, Umrah and Ziarah published by Tabung Haji. This game is suitable to be played by 2 to 4 players at one time. Each player will start the game as a Muslim individual who wants to perform umrah and hajj. Throughout the game, players will go through the boxes that explain the procedure for performing umrah and hajj, both practically and verbally. Players will also be tested related to knowledge about umrah and hajj through GUG Mind Test questions, Pillars Questions, Dam Questions and Badal Haji Questions provided. Players who successfully answer the questions will get rewards that have varying score values. This GUG game will end when the player reaches the end of the box as soon as he answers the Badal Haji question. The winner of this game will be determined based on the maximum rewards that have been collected. At the end of the game, players will get a clear picture of how to perform umrah and hajj perfectly.

This GUG game can be played with two methods. The first method is to use board games, dice and also card. Through this method, players at the same time can use the Augmented Reality (AR) Global Umrahaji Game (GUG) application to scan and view the practical procedures for the pillars or obligatory of umrah and hajj. Scanning using this AR GUG application can be done while the player stops in any of the Pillars or Obligatory of Umrah and Hajj squares while playing. Through the AR GUG application, players will be able to find out how the actual procedure of practising the pillars and obligatory of umrah and hajj is performed. The second game method is to play using the Global Umrahaji Game (GUG) mobile game application via smartphone.

The first product based on Islamic education, Umrah and Hajj in Malaysia, and in the world.
Based on Book of Ibadat Haji Umrah and Ziarah by Tabung Haji.
Based on Syllabus for Ibadah KAFA subject, standard 6.
Based on Islamic Education syllabus for standard 1,2,4,5 and form 1,2,4,5.
Based on Syllabus for Syariah Islamiah Education subject for form 4.

The Concept of Fun Learning : Creating fun learning concept in education by using UmraHaji board game as a learning aid tool.

PAK21 Patterned : Very relevant with the pattern of Pendidikan Abad Ke-21 (PAK21), thus UmraHaji board game creates an active learning atmosphere and interactive communication between teachers and students.

Training of Related Agencies : One method of training for mutawwif, pilgrimage mentor and congregation in regards to the correct implementation method of Umrah and Hajj and learning Umrah and Hajj knowledge practically.

A scientific board game with umrah and hajj theme to apply the concept of entertaining and interactive learning (fun learning) in umrah and hajj worship education theorically and practically.

Through the mobile game and AR GUG application, players will be able to find out how the actual procedure of practising the pillars and obligatory of umrah and hajj is performed.

Becoming a tool or learning aid in school and courses related to Umrah and Hajj in Umrah and Hajj travel, including educational institution.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

COMMERCIALIZATION POTENTIAL:

INSIDE AND OUTSIDE OF THE COUNTRY

Kementerian Pelajaran Malaysia
Pustaka Ilmu Bakti and Pustaka Rakyat, Perpustakaan Awam and Desa dll.
Yayasan Inovasi Malaysia, SME Corps
Kerjasama Bersama Universiti Brunei and Thailand
KL Braille Resources

AGENCIES RELATING TO PRODUCT

Umrah & Hajj Management Agencies (Kelab Taha, Tabung Haji, Angsana, Simply, Al-Quds, Tursina Travel, etc.)

CUSTOMERS TARGET:

Primary and Secondary Students : 7-17 years old (City Students, Rural Students, Inland Students, Special Education Students)
Mutawwif, Educator
OKU (the disabled), muallaf and asnaf
Umrah Hajj Agencies, Society and Rural Community

BUSINESS CANVAS:
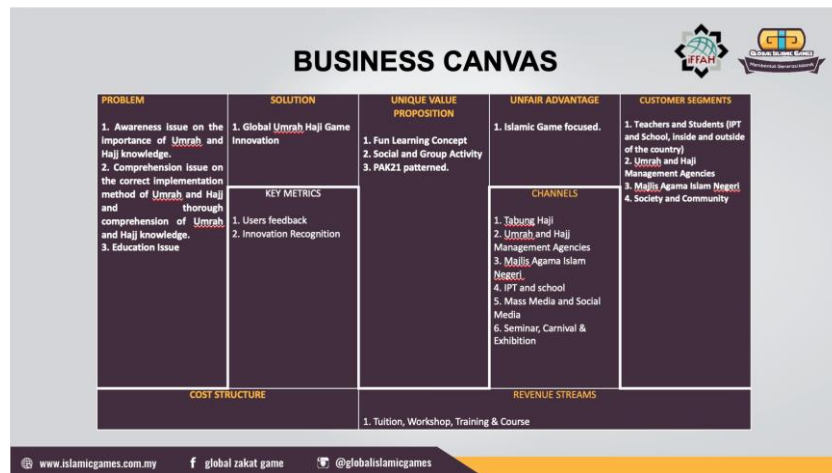
INTELECTUAL PROPERTY : COPYRIGHT

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POWERPUZZ WITH QUIZIZZ FOR POWERFUL SENTENCES

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Highlights: The innovation in this research is PowerPuzz, a cost-effective and practical tool which is proven capable to help upper primary pupils in developing the correct form of sentence structures. PowerPuzz was developed based on the idea of providing an interactive PowerPoint learning experience for the pupils. With the integration of digital puzzles and the online learning platform called Quizizz, pupils can recognise the four different sentence structures, mainly the S-V-O, S-V-C, S-V-O-O, and S-V-O-C, aside from developing their 4C's and 1V. Thus, it is clear that PowerPuzz has high potential in helping low-proficiency level ESL learners to write better.

Key words: PowerPuzz; primary pupils; interactive PowerPoint; online learning; Quizizz; 4C1V

Introduction

It is strongly believed that games would be able to help pupils learn and remember the correct sentence structures in a fun manner. According to Zakaria et al. (2016), the usage of Information and Communications Technology (ICT) is becoming more widespread these days, including in the classroom because ICT is perceived as the modern way to learn. By incorporating ICT in this research, the researchers have developed a game-based learning tool called PowerPuzz, using Microsoft PowerPoint, which aims to help pupils recognise and remember the different sentence structures using puzzles. Thus, this research aims to enhance Year Four primary pupils' sentence construction skills using PowerPuzz with Quizizz to create a meaningful, fun, and exciting learning environment.

Content

This research used a quasi-experimental method type of research design. The pre-test and post-test design was incorporated to evaluate the effectiveness of the innovation and its educational implication towards the respondents. 40 Year Four pupils were selected for this research. In this paper, three research instruments were used, mainly the pre-test and post-test, observation checklist, and survey questionnaire. The data obtained were tabulated and analysed descriptively. The respondents' scores in the pre-test were compared to that of the post-test with reference to the Criterion Referenced Assessment (CRA). Table 1 below shows the descriptive statistics of the data collected from both pre-test and post-test.

Table 1: Results of the Pre-test and Post-test

Score	Grade	Number of pupils	
		Pre-test	Post-test
80 – 100	A	0	36
65 – 79	B	6	4
50 – 64	C	5	0
40 – 49	D	10	0
0 – 39	E	19	0

The data obtained shows that there was a major improvement in the respondents' post-test results as compared to that of the pre-test. In the pre-test, none of the research respondents managed to get an A but in the post-test, a total of 36 respondents scored an A. The significant difference between the results indicates that the PowerPuzz game and Quizizz have managed to enhance the research respondents' sentence construction skills.

A survey questionnaire was also handed out to the research participants to evaluate the innovation. The survey questionnaire, adapted from Pintrich and DeGroot (1990), consisted of six statements and the respondents were given the choice to tick either "Agree" or "Disagree". 92.5% of the research respondents agreed that they had fun with the PowerPuzz Game and Quizizz (Question 1). Based on Question 5 which also focuses on the respondents' motivational level, 95% of the respondents agreed with the statement "I am interested to play the PowerPuzz game and Quizizz again". On the aspect of collaboration, 87.5% of the research respondents agreed that they helped their friends who were not able to remember the sentence structures correctly. Lastly, the respondents unanimously agreed with the statements "I know how to construct sentences correctly after using the PowerPuzz game" and "I can remember the sentence structures correctly" (Question 3 and Question 4). With the 100% agreement from all 40 research respondents, it is safe to say that the respondents were able to recognise and remember better the sentence structures learned using the PowerPuzz Game and Quizizz.

The results from the pre-test and post-test have clearly shown the effectiveness of the PowerPuzz Game with Quizizz in enhancing the learners' sentence construction skills. The research participants have shown significant improvements in their results after the implementation of the innovation. This will enable the research participants to convey their thoughts in written form as a productive skill in the future (Yunus, May & Mohideen, 2019). According to Yunus and Azman (2019), the incorporation of games in lessons has high potential in improving learners' memory and understanding, aside from promoting fun and motivational learning which are in line with the aspirations of the 21st century education learning system.

The PowerPuzz is a learning tool unlike any other. During the development process, the researchers focused a lot on how to help learners who do not have an easy access to the internet, particularly those in the rural areas. Thus, the PowerPuzz was invented because we know that in the process of achieving the greater good, learners would still need to learn and be technologically savvy even when they are still in school. PowerPuzz is easy to use and can be accessed using any computer or laptop, and even cellphones. More importantly, it does not require any internet connection but still effective, motivating, and fun for all learners. As a conclusion, it is clear that the use of PowerPuzz with Quizizz is practical and effective in enhancing learners' sentence construction skills.

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PRESENTING THE NEW FORMULA OF NEWS WRITING SKILLS THROUGH AUGMENTED REALITY TECHNOLOGY

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Highlights:
True and honest are among the factors that contributed to the fair of news reporting. However, the importance to develop understanding in news content is also important as this can give impacts to the society. Therefore, the new news writing guideline is designed to guide and help students to create content with fair and impactful**.** Presently, **this guideline have been transformed into Augmented Reality in which to** enhance the teaching and learning method as this is very handy where it can be downloaded at Google Play Store to improve their writing skills especially in relation to Islam and Muslims issues.

Key words: *acrostic model, news writing guideline, journalism, augmented reality, teaching and learning, Islam and Muslims*

Introduction

This project is intended to explore the changing landscape of news reporting especially on Islam and Muslims issues specifically by International media reports. The burgeoning research about this issue is like never-ending. The work of Ghouri and Umber (2019) highlighted that the reporting slant between *The Age* and *The Australian* is different. The findings showed that *The Age* portrayed Islam and Muslims positively while *The Australian* construct news about Islam and Muslims negatively and critically. This research has been conducted due negative reception experienced by Muslim community in Australia after several terror incidents associated with Muslims such as 9/11, 7/7, Bali attacks, Madrid bombings, Brussels shootings and etc. (Alharbi, 2017; Alghamdi, 2015; Munro, 2006; Akbarzadeh and Smith, 2005). Not only abroad, the misrepresentation of Islam and Muslims also takes place in Malaysian media trends especially by irresponsible society who would like to post, share, disseminate fake news, videos, photos about Islam and Muslims issues through social media. Hence, this project is to map out again the guideline in news reporting by gaining the information and experiences from Malaysian media practitioners.

This innovation has been gained through in-depth interviews amongst Malaysian media practitioners which are very valuable. They have shared their experiences in the media industry during the interviews and all the interview outputs have been analysed qualitatively. As a result, an acrostic model based on the analysis has been initiated as to facilitate students to memorize the new model of news guideline. The new model of news writing guideline named F.A.I.T.H.F.U.L has been created to help journalism students gain new insights of news writing skills especially related to the issue of Islam and Muslims. The innovation about news writing guideline has been designed as to improve what is taught by the Western scholars by adding news elements that are more applicable to be used amongst journalism students.

Figure 1: The F.A.I.T.H.F.U.L Formula

The F.A.I.T.H.F.U.L formula is imperative as now we are facing the influx of fake news especially in the social media. The plethora of social media applications nowadays also has worsened the news content especially on Islam and Muslims issues. Thus, Universiti Sains Islam Malaysia (USIM) which its vision to uphold the Integration of Naqli and Aqli (INAQ) especially through teaching and learning has taken the responsibility to offer a new paradigm of news reporting in a global view. Thus, this is the responsibility of the future respected journalists who are encouraged to create the good surrounding in social media ecosystem with ethics, integrity and embraced Islamic principles. This model becomes one of the enablers or platforms to proliferate positive reporting about Islam and Muslims. To support the teaching and learning in the era of Revolution Industry 4.0, this formula has been transformed into Augmented Reality. Examining augmented reality in journalism field has been showed through the work of Aitamurto et al. (2020) who emphasized the importance of reading news through augmented reality which can give new experience to the news readers and providing multi-information to the users. Furthermore, Pavlik (2019), Pavlik and Bridges (2013) perceived that AR may become the means to enhance the audience engagement while Di Serio et al. (2013) and Yoon et al. (2018) stated that AR can be the most effective storytelling medium in journalism. The relevance of AR in teaching and learning is definite, thus, the F.A.I.T.H.F.U.L formula has been transformed into an AR as to offer new approach of learning writing skills. The plus point here is this formula can be downloaded for free using Google Play Store to expedite students in learning about this formula anywhere and anytime.

The invented model is designed based on Islamic perspective in order to enlighten the standard and quality of reporting especially issues on Islam and Muslims. This model has been registered as a copyright and has won National Research Award in 2019. This model is designed to guide and help students who want to create content either in a form of writing, video, photos or others.

This project is merely for education purposes without any profit gained. Any android users may download this project for free as this can be a plaform to educate writers/citizens/readers on how to

write news with ethics and integrity. This innovation is very much significant for university students especially those taking Media Studies. It will guide them to produce good news about Islam and Muslims based on authentic sources. This FAITHFUL formula will enable students to practice good ethics in their writings as media practitioners. Besides, the use of apps with augmented reality technology in classroom for teaching and learning is very trendy and cool. Students will be so eager to explore it throughout their lessons hence changing the conventional teaching method to something more creative and fun. Despite its useful application to students in the field of Media Studies, this AR technology can benefit the public who are among the media users and audience. The application of this apps will help the users in filtering news that is not of worth reading due to various ethical reasons. In conclusion, we hope that this small contribution can help the students or even the journalists with the right reporting techniques when covering news on Islam and Muslims. We strongly believed that the teaching and learning strategy should always be updated to go aligned with advanced technology.

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REV-OPOLY: INTERACTIVE BOARD GAME WITH MOBILE AUGMENTED REALITY

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Highlights: REV-OPOLY is a board game with augmented reality (AR) intervention in the area of emerging technology revolution. It consists of a board, tokens, money, and four types of cards; knowledge-based cards and two stacks of related-theme questions. These cards are used as AR markers. When players scan these markers, they will be directed to a web page containing sample answers of questions in the form of three-dimensional (3D) text, image, animation, or video. By experiencing this, players can enjoy a new method of learning through an augmented reality board game.

Keywords: augmented reality, gamification, interactive learning, student-based learning, educational technology

Introduction

Advances in digital technology have opened up many possibilities to infuse the different types of technologies in strengthening the process and experience in teaching and learning in higher education. Augmented reality (AR) is one of the technologies that is progressively being used in education for interactive lessons by combining virtual and real environments. AR is considered a widely accessible technology as the majority of the population around the globe are using smartphones. AR features aspects that enhance learning, engagement, and aid in teaching as it allows information visualization. Despite the advantages that it offers, if students depend solely on technology in their daily lives, it can disconnect them from social interactions. Thus, this research proposed REV-OPOLY, which is an interactive board game with AR. Board games have the advantage of promoting valuable social skills for players through interaction and competition. REV-OPOLY concentrates in the area of the emerging technology revolution, which is a part of the Computer Application in Management curriculum offered in Universiti Utara Malaysia (UUM).

The Innovation

REV-OPOLY is a board game with AR on the emerging technology revolution. It consists of a board with 40 spaces to buy, pay or collect rent from 26 technologies. For instance, "Inventor" spaces are recognition given to inventors of the industrial revolution, while "Chance" and "Did You Know?" spaces are functioned which the player has to draw a card according to the space they land. The "Chance" cards have various types of advantages such as "Ask ONE other player to assist with the current question". As a way of retaining the distinctive learning while playing, the "Did You Know?" cards contain information of the technologies such as the meaning of the terms, examples, and impact of the technology towards various sectors. These cards can be used as revision flashcards outside of the game. REV-OPOLY also has dices, player pieces that can be scanned to reveal a 3D character and can be customized, play money, and technology Title Deed cards.

The objective of this game is to become the wealthiest player by owning and collecting rent of the technologies. To own the technology, the player has to answer the question correctly from the stacks of the "IR Question" or "Technological Question" card before they can purchase it. These cards cover

different types of technology questions. To make the game more interesting and to encourage discussion, another player who agrees with the current player's answer can invest in the technology. Each player is given four investment opportunities. If the player answers wrongly or does not know the answer, the player will be fined. This enforces the players to learn, understand and grasp the knowledge of the emerging technology revolution. The sample answer can be viewed by scanning the AR image of the question card aligned to space on the board as a 3D text, image, animation, or video.
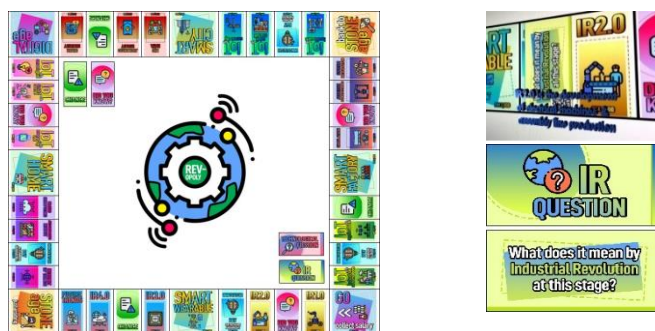
(a) REV-OPOLY board (b) 3D AR sample answer

Figure 1: REV-OPOLY components

Importance to Education

The elements of gamification in REV-OPOLY can attract students' interest. REV-OPOLY helps to assist and enhance students' comprehension level on the emerging technology revolution topic. In the game, they are required to make explicit references to previous learning by applying knowledge into the game and convert the knowledge gained into formal learning. As REV-OPOLY is expected to be played as a multiplayer game, it acts as a group study in which students who have mastered the topic can assist weak students through the game's rule on technology investment. Moreover, "Chance" cards provide advantages and opportunities to players such as "Ask ONE other player to assist with the current question" card. This has the benefits in refining their understanding through discussion and explanation, sharing abundant information, developing stronger communication skills, and increasing their confidence level as they have to engage to defend their answers.

Advantages of the innovation

REV-OPOLY opens up a new learning experience for the students as an alternative to the typical learning method. Using the nature of games as an informal medium to learn while play, REV-OPOLY helps the students to focus while enjoying the learning process. It can substitute lecture slides or books to understand the subject. The question cards provided encourage the players to engage, interact and have constructive discussions among them. Sample answers for all the questions are provided as guidelines which can be viewed through the AR marker. REV-OPOLY's AR requires connectivity to the Internet and it supports any types of web browsers. No specific software and application are required to be installed or downloaded.

Commercial Potentials

REV-OPOLY is marketable as a physical board game that integrates AR in the player's pieces and cards. These AR parts allow updates of the game to be done without affecting the physical board. REV-OPOLY focuses on the emerging technology revolution in the Computer Application in Management curriculum. However, the generality of this topic allows REV-OPOLY to be enjoyed

and benefited individuals who are interested to learn and know more about this area.

Acknowledgement

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EDGE ONE-STOP CENTRE

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Highlights: EDGE One-Stop Centre application is a platform for students to get advisory on entrepreneurship, start-up a new business, apply for part time job, and apply a loan for a new business and more. The main goal of this application is to open opportunities for students to venture into entrepreneurship. This application will show how to get involved in entrepreneurship, how to apply for loans and more. In conclusion, users can still motivate themselves to succeed in entrepreneurship.

Keywords: One-Stop Centre, entrepreneur, job opportunity, EDGE, entrepreneurship, business

Introduction

Nowadays, many people or students want to venture into business but do not know how to start. Most of them need guidance such as motivation, workshops and so on. Especially in current situation right now, many people especially students affected by the Covid-19 pandemic. After that, many of them also lost their jobs as a result of this pandemic. Entrepreneur is an individual who creates a new business, bearing most of the risks and enjoying most of the rewards. The entrepreneur is commonly seen as an innovator, a source of new ideas, goods, services, and business or procedures. EDGE is Entrepreneurial Development and Graduate Employability Centre. EDGE is providing early exposure of entrepreneurship and business basics to students, providing understanding, techniques, procedures and other things in shaping student mentality as entrepreneurs.

Content

Description of your innovation

EDGE One-Stop Centre was a platform where student can learn how to involve into an entrepreneurship. EDGE One- Stop Centre also wants to increase the number of entrepreneurs as well as to increase the country's economy in the future. Most students are now beginning to be interested in venturing into entrepreneurship but don't know how to get started. So, with EDGE One-Stop Centre application the students can learn how to venture into the entrepreneurship easily. EDGE One-Stop Centre was created is to make the users especially students to start a new business, apply a loan for a new business and more. EDGE One-Stop Centre also tells the user what program is EDGE provide to the students. Other than that, EDGE One-Stop Centre is different than existing website or application like EDGE UPSI because for the design is informal and colorful that can be more interesting to surfing.

Context or background of the innovation

In this era of globalization, many have become entrepreneur. Basically, many people have a lot of interested to be an entrepreneur but doesn't know how to start correctly. Their keep searching for place or Centre to guide them to the first step. Other than that, cause from Pandemic Covid-19 also many people are lost their job, inadequate salary and depression.

According to Asia–Pacific Employment and Social Outlook 2020: Navigating the crisis towards a human-centered future of work estimates, the economic backlash of the COVID-19 pandemic wiped out some 81 million jobs in 2020. In nearly all economies with available quarterly data for 2020, employment levels contracted compared to 2019. So, with EDGE One-Stop Centre, many people especially student now can take a first step from this application to be a successful entrepreneur out there. EDGE One-Stop Centre also wants to help if their have any interest to be an entrepreneur, so that their can get an advisory to be an entrepreneur. EDGE One-Stop Centre also provide a loan form where the users can apply the loan to start a new business. Other than that, if them don't wants to venture into entrepreneur, the users also can apply a job that UPSI offered. Now that, many students don't get a chance to apply that job because the faculty that offered the job only call a known person to fulfil the job vacancy. Now, with EDGE One-Stop Centre the users can apply the job and submit their latest resume, after that waiting for their approval.

Why are they important to education?

Entrepreneurship education has become popular for many reasons. Learning about developing business plans and creating a company allows students to better understand and integrate finance, economics, accounting, marketing and other business disciplines, offering them an integrative and enriching educational experience. Entrepreneurship education encourages the founding of new businesses by students and alumni and equips them with critical decision- making skills that enhance the success of graduates in the job market. Furthermore, the entrepreneurial mind-set increases the transfer of technology to the market, from the university, through the development of technology-based business plans and student involvement with technology licensing. So, with EDGE One-Stop Centre, students can easily learn and involve into entrepreneurship. Finally, entrepreneurship education creates links between the academic and business communities. Education for entrepreneurship is considered a useful, applied approach to the study of business and the economy.

Advantages of your innovation towards education and community

EDGE One-Stop application allow students to apply a job offered from any faculty in Job Opportunity page. This advantage can to some extent help students to earn more money to support their living. This application also offer user to apply a loan that provided from EDGE UPSI. These loans can help students to start their business and be able to grow well. Unregistered user or visitor can send any suggestion, report or question in contact us page. The advantage of the system is attractive design, informational and relevant content. The system let the user to be able to view and read all the information given.

Commercial value in terms of marketability or profitability of your innovation

EDGE One-Stop Centre application have their own commercial value. This application was user friendly which is the user can easily spot what is going on next. EDGE One-Stop Centre also bring a new innovation which is have a job opportunity offered for student. Before this, job opportunity only offered for known person and not offer for public. So, with EDGE One-Stop Centre, now everyone can apply a job that offered from faculty.

Acknowledgement

Deepest thanks to my supervisor Dr. Nor Masharah Husain for her patience, guidance and supervision

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EXPERT ENGLISH

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Highlights: Expert English is a site that representing English e-learning system to help the students to enhance their English skill and knowledge in a variety of ways. The system provides more kind of self- learning platform for the student especially during Covid-19 pandemic. The purpose of this project is to develop an interactive learning website as a comprehensive and effective teaching tool to help the students who needed to improve and polish their English skills. In addition, the current teaching method more individualistic which is a teacher teaching method and students find it boring and less interactive. As a result, student find it difficult to understand and learn English.

Keywords: English, English learning, expert English, interactive learning.

Introduction

As in any other sector, the COVID-19 pandemic affected education in many ways. Government actions have followed a common goal of reducing the spread of corona virus by suspended face-to-face teaching and exams as well. It is possible to develop interactive learning environments to support new ways of learning for the student who are likely to play an important role in the future. In addition, with the development of interactive learning website will help the student to encourage and enhance creativity, thinking and expression which are very much needed. The main point of this project focuses within the design of an interactive learning website to support learning in complex domains for the students especially during this Covid-19 pandemic.

Expert English is a site that representing English E-learning system. The system provides more kind of self-learning platform for the student especially during Covid-19 pandemic. The purpose of this project is to develop an interactive learning website as a comprehensive teaching tool to help the students who needed to improve and polish their English skills. Expert English will guide learners in effective and enjoyable ways. This website includes learning materials for grammar, a space for listening practice, entertaining spelling quizzes and reading materials on all sorts of interesting topics. Through Expert English, we can see interactive learning is important in education to prevent the lack of their English skill in the future.

Content

Description of your innovation

Engaging students in online learning is one of the keys to ensuring that students learn effectively and enjoy what they are doing. For that reason, one of the most effective ways to make student more engaged in what they are doing is to make it interactive. To develop an interactive learning website, we need to make analyzing learning outcomes and designing constructivist learning environments to keeping users engaged and coming back for more. The best interactive learning website design will support this knowledge through a clean layout, captivating images, accurate information in all its contents, responsive and engaging features.

We will make a quick research before all comes down to begin thinking about design, development

or anything else by making some websites as references to come up with an idea. Figuring out the best ways we can deliver information to the user.

Context or background of the innovation

Expert English is a system is representing English E-learning system for the student. Nowadays, there are a lot of online education systems in Malaysia. The main purpose of those systems is to provide a better and effective way to help students to get learning materials and information. In addition, Expert English deliver learning experiences that enable students to actively engage with informative content. Expert English contain four section for the student who needed to improve and polish their English skills which are reading, spelling, and listening and grammar section.

The problem statement is that the current teaching method more individualistic which is a teacher teaching method and students find it boring and less interactive. There is time limitation for the student to communicate with teacher especially online classes during Covid-19 pandemic. Students have had to learn self-motivation and problem- solving skills to ensure they can take part in the online learning especially any programmes hosted by their teachers.

Why are they important to education?

The objectives of this project are to find possible solution for students whom slow learner and are unable to acquire knowledge that they need. Especially due to Covid-19 their performance will get affected. In addition, Expert English help the students to enhance knowledge and skills in a variety of ways, from engaging video and dynamic graphics to data visualizations and interactive elements. In this project, a web base learning management system also knownas e-learning management system will be developed for the students. Expert English designed to encourage student to use and learn English language. For instance, Expert English will make them think it is easy to master English.

Advantages of your innovation towards education and community

The advantage of the system is attractive design, informational and relevant content. The system let the user to be able to view and read all the materials and answer the quiz given to test their understanding in some section. The user can play video for reading and audio for listening section. Some user doesn't want to interact directly but they still want to share their feedback and review through their experience on the website. Besides, every piece of user feedback is an opportunity to measure the user experience and improve upon it with critical feedback. As an alternative way, the website will provide a contact section and feedback form for the user to input their email and share their comment about the website. These feedback from the users will be displayed on the website and it can be view by all of the users. Every piece of feedback will help to improve the user experience on the system in the future. Encourage people to point out spots where problems may occur and where improvements could be made.

Commercial value in terms of marketability or profitability of your innovation

Expert English has free access to the users where they can use the website for free. The system is user friendly and it has interactive background design which can attracts the user to use the website. This website platform containing online courses and material for students of all ages. The system provided an easy and quick tool to access the system anywhere and anytime by using your phone, tablet, or computer online using any web browser such as Google Chrome, Mozilla and Internet Explore. Expert English also can be access using Android, Windows, MacOS and iOS user. This web-based platform that provides personalized educational content using adaptive learning technology. There are now many educational websites receiving very many visitors who return regularly to study online.

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SPACEDEMY

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Highlights: SpaceDemy is an open source and free to use website for the user to find any information or just to view anything about the space. The system is very user friendly and it has its interactive background design which can attracts the user to use the website. The website will contain some quizzes for the teenager and student to do and let them gain more interest in space and science technology. The system provided an easy and quick tool to access the system anywhere and anytime by using your phone, tablet, or computer online using any web browser such as Google Chrome, Mozilla and Internet Explore. This web-based platform that provides personalized educational content using adaptive learning technology.

Key words: Space, Interactive Learning, Planet, solar system, quiz

Introduction

Nowadays, most of the student and teenager are not giving enough awareness to the space and science technology. So now, Malaysia recognizes the needs of access to science and space technology capabilities to improve the needed by the people, economic growth, socio-economic and national security. Science, Technology and Innovation (STI) is one of the main pillars in MOSTI. Malaysia recognizes the needs for access to science and space capabilities to improve the services needed by the people, economic growth, socio-economic and national security. The National Space Agency (ANGKASA), The Planetarium and Pusat Sains Negara play important roles to promote science and space technology among Malaysians especially for students.

SpaceDemy is an interactive learning website to increase the awareness and interest of science and space technology for students. Through SpaceDemy, we can now increase the awareness and interest of science and space technology.

Content

Description of your innovation

SpaceDemy is a website that everyone that have any interest with space can come and have some fun and can learn some knowledge from space fun. Space fun allow people to learn and can make people have interest in space or space technology. In this web site the main focus is about the solar system that include the eight planets in the outer space and of course the moon and the sun. The objective of this website is to be easy to use and easy to access by users. This system is developed by using prototyping methodology and has been evaluate by 40 users.

Nowadays, people are losing interest in the topic of space or space technology so the aim for me to create this website is to make the people to gain some interest and also learn some knowledge about space in an interactive way of getting the info and learning thru space fun.

Context or background of the innovation

SpaceDemy is a system that is mainly focused on space and the planet of the solar system for teenager or student. The main purpose of SpaceDemy is to let the teenager to gain interest in space, science and technology. SpaceDemy is design to make the website an interactive and fun learning website. The website will consist of a lot of interactive element and also by using the space theme, space background, quiz about space to make the teenager to gain interest in space, science and technologies.

Why are they important to education?

The objective of this system is to increase the awareness and interest of science and space technology among teenager and students and also at the same time, SpaceDemy wanted to provide a website for the user to search for information for the information they wanted about science and space technologies easily. In the ither hand, SpaceDemy also want to let user learns more about the space and science technology.

Advantages of your innovation towards education and community

The advantages of the innovation is the SpaceDemy is an interactive learning website that will make the teenagers to gain more interest in science and space technology. The color and the theme used in the website is all the color that will attract a lot of teenager to the website. The second advantage is that the website is very user friendly. The user can find the information that they need very easily and it is very accurate. Based on result testing on usability evaluation, most of the tester are strongly agree that SpaceDemy meet the user expectation on contents appropriate, design and layout, also feel confident using the website, would you recommend the website to your friend and others. SpaceDemy also provide video and interesting picture of the space for the user to know what are they looking at and help the user to understand more.

Commercial value in terms of marketability or profitability of your innovation

SpaceDemy is an open access web-based system that give free access to the users where they can use the website for free. The system is user friendly and it has interactive background design which can attracts the user to use the website. This website platform containing online courses and material for students of all ages. The system provided an easy and quick tool to access the system anywhere and anytime by using your phone, tablet, or computer online using any web browser such as Google Chrome, Mozilla and Internet Explore. SpaceDemy also can be access using Android, Windows, MacOS and iOS user. This web-based platform that provides personalized educational content using adaptive learning technology.

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DETECTIVE FRAUD: A DETECTION APPLICATION WITH MACHINE LEARNING CLASSIFICATION ALGORITHMS

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Highlights: Fraud is a universal term for an act of deception or lying under false pretenses to retrieve information, money, or goods from the victim. According to an incident report done by CyberSecurity Malaysia (MYCERT), In 2020, 70% of reported cases are mainly fraud-related. However, one main similarity all the fraud cases have is the victims are often approached via mobile telecommunication or social media platforms such as Facebook Instagram and many more. The aim of this application is to address the fraud cases in Malaysia by creating a central resource application which enables users to identify, register and track the current status of fraud cases in Malaysia. Furthermore, this application will also integrate a machine learning classification model such as K-Nearest Neighbor (KNN) and Naive Bayes in determining the pattern of fraud cases which occurs in Malaysia. The system will use the perpetrator phone number, social media account id or nickname and location to determine the pattern

Key words: fraud detection, machine learning, Classification Algorithms, K-Neighbor pattern, Naïve Bayes pattern

Introduction

In the current state of a global pandemic, Covid-19, information, and communication are highly revolved around indirect digital communication either through web-conferencing, social networking sites, or telecommunication. In Malaysia, our mobile numbers are the most vital asset as it is linked to the identification card. However, due to a recent data breach reported, most of the Malaysian mobile numbers have been leaked to the web and some are even sold to companies without the user's consent and knowledge. With the unlimited illegal resources of users' personal information, name, and mobile numbers, the perpetrator is able to commit their crime behind the gadgets. Retrieving that stolen information may no longer seem viable as the data is exposed, however, creating a system that stores information related to the perpetrator will allow the higher authority to apprehend the perpetrator more efficiently.

Background of the Innovation

Description of DetectiveFraud: A Detection Application with Machine Learning Classification Algorithms

A fraud detection application is an application that allows users to register information about the petraptor, fraud-related crimes or to register potential scammers. This application will enable users to submit a list of information on suspected fraud events. The application can also be used by food delivery companies, e-commerce businesses, and ride-sharing companies. The purpose of this system is to protect and prevent any future fraud cases from occurring and also reduce the number of fraud

cases in Malaysia. The integration with machine learning helps to reduce the redundancy of data and promote a more accurate result produced in the system. Machine Learning Algorithms will classify the data into different classes according to its relevance.
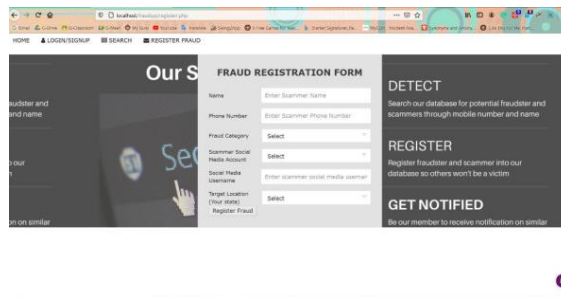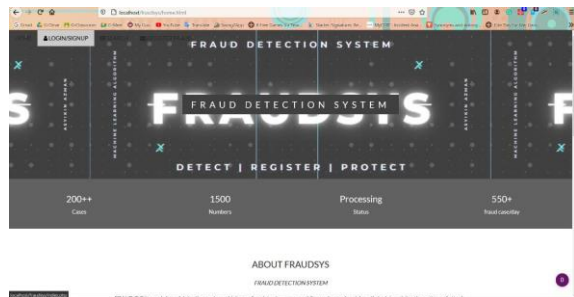
Background of the DetectiveFraud: A Detection Application with Machine Learning Classification Algorithms

The design and development of DetectiveFraud refers to ADDIE instructional design and development model which involves main processes namely i) Analyse; ii) Design; iii) Development; iv) Evaluation and v) Implement as shown in Table 1.

Table 1: The design and development of DetectiveFraud.

Phase	Description
Analyse	The purpose of this system is to protect and prevent any future fraud cases from occurring and also reduce the number of fraud cases in Malaysia. The integration with machine learning helps to reduce the redundancy of data and promote a more accurate result produced in the system.
Design	All the features and functions that suggested will be designed accordingly to meet the user requirement. DetectiveFraud overall user interfaces are developed with HTML 5.
Development	DetectiveFraud is developed using Django Framework with PHP development.
Evaluation	200 participants will test the application through heuristic usability testing to validate the effectiveness, efficiency and satisfaction of the web-based application
Implementation	The final web-based application will up to the real life server with an attractive domain. Users can register and access the web-based application to use all the initial features provided.
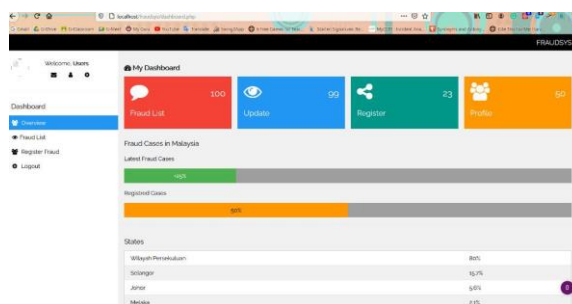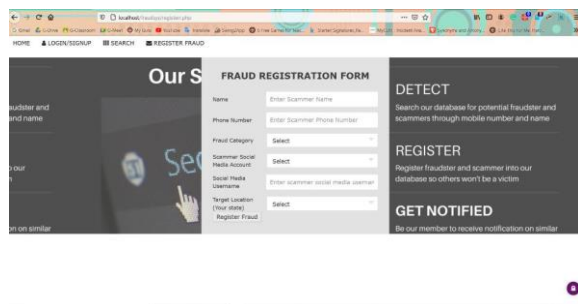
Significant of Application

Reduce the percentage of fraud incidents reported in Malaysia.

Creating an opportunity for commercial sectors in integrating Machine Learning Algorithms into their system.

Provide a resource system for authorities to identify and detect scammers or fraud cases occurring in each individual state in Malaysia.

Commercialization Aspects

The technology readiness level (TRL) of this system has reached level 4 (Feasibility Demonstration) and the copyright   for DetectiveFraud in the process of applying to MyIPO, Malaysia. As this is a web-based application, it can be accessed and registered via Internet connection. As this product focuses on fraud detection with machine learning, it can be marketed to all Internet users, especially the user of social media applications in South East Asia such as Malaysia, Singapore, Indonesia and Brunei.

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FLIPPED CLASSROOM WITH AUGMENTED REALITY (AR) CLINICAL SKILL LAB

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Highlights: The potential of combining smartphones and Augmented Reality (AR) for education is big, grant students' extra digital information and make learning more fun. AR clinical skill lab created by our team use Zappar Augmented Reality App. The image contain AR code are provided besides the equipment at clinical skill lab and also uploaded in learning management system and the students can play before the class (flipped classroom concept). The user satisfaction survey was done and showed that most of the respondents satisfied with the innovation. AR is on the way to becoming an important part of education, and its use will continue to grow.

Key words: augmented reality, AR, clinical skill, flipped classroom, medical education.

Introduction

Flipped classroom is a pedagogical approach in which direct instruction moves from the group learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter (The Flipped Learning Network, 2014). It is a blended learning model where classroom activities are reversed or flipped. Jeff Dunn (2014) has wrote six easy steps for implementing; plan, record, share, change, group, and regroup.
Our flipped classroom model is delivered via augmented reality (AR) technology. AR is a technology that integrates virtual objects into real environments to facilitate real time interaction. In other words, AR has three requirements; combining virtual and real objects in a real environment, aligning real and virtual objects with each other, and real-time interaction (Tasnem Khan et al. 2019).

Content

Description of the innovation / product development / design / process.

Augmented reality (AR) Clinical Skill Lab was innovated by using Zappar augmented reality platform. Before we publish the module, we need to plan the learning outcome (at least one learning outcome) needed. It is align with our learning outcome from our teaching subjects so that the tool we use not only for fun and engagement, but it should be centred on students' interest. We also plan one to three instructional activities for students to participate in so that it provides active student engagement. The work project that we publish is editable, so we can update the contents anytime. Therefore, the module that we create is reproducible, relevant, and sustainable over time. Compare to the traditional method, the usage of AR more cost-efficient because we do no need to print the new posters if we create the new contents, and no need to print the paper; encourages green technology.

Before the pandemic, we exhibited posters that contain the AR image beside the manikin. The students might scan the poster and learn before the class with the lecturers (flipped classroom approach). So the students had more time for the practical session under direct observation with the lecturers. During remote learning, the images that contain AR were uploaded into our learning management system

(Moodle). So students had more time for discussion during the synchronous learning using videoconferencing.
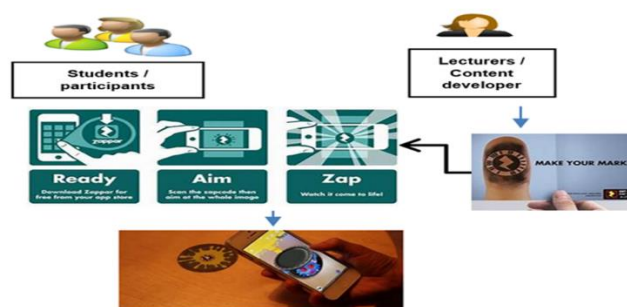
Figure 1: Augmented reality (AR) framework using ZapWorks.

What is the context or background of the innovation / product development / design / process?

Our innovation was based on student issues and problem-solving. The students arise the issue regarding the class for clinical skills relatively too short for them to learn from their lecturers and for them to get first exposure before they practice on their own on the manikin at our clinical skill laboratory. With the traditional class, most students practice clinical skills after the class. So we changed the concept to the flipped classroom, where lectures are video recorded and integrated with AR technologies to be watched outside the class. So with the flipped classroom, all students have a chance to actively complete the practice during the class.

This innovation is build based on the SAMR (substitution, augmentation, modification, and redefinition) model. The model was created to share a common language across disciplines as teachers strive to help students visualize complex concepts. On one end technology is used as a one-to-one replacement for traditional tools, and on the other end, technology enables experiences that were previously impossible without it.

Related learning outcome clusters MQF 2.0 for this innovation is cluster 3A; Practical Skills (Malaysian Qualification Agency, 2019).

Why are they important to education?

The innovation create flexible spaces in which students choose when and where they learn. This model shifts instruction to a learner-centered approach, where in-class time is dedicated to exploring topics in greater depth and creating rich learning opportunities. The use of AR may increase the motivation, attention, confidence, and satisfaction of the students.

Advantages of the innovation / product development / design / process towards education and community.

This innovation allows students to work at their own pace and readiness level. They may replay or review parts of the contents as needed. They able to prepare questions to the lecturers before coming to the class. Another advantages is that they have more discussions with lecturers while they are applying the knowledge.

Commercial value in terms of marketability or profitability of the innovation / product development / design / process.

For commercialization, we will use the AR technology and be implemented into our 'Virtual Clinical Skill Lab' for exhibition and school visit to encourage STEM among secondary school. However due to pandemic, we postponed our plan to open for visit. Besides that, we are in the process to publish the booklet and module of basic clinical skills lab with AR features.

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POCKET LINGUA SIGN MOBILE APP FOR LEARNING SIGN LANGUAGE

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Highlights: Sign language is communication skills that use hand movement, body movement, and lips to give information and meaning from the speaker. Pocket Lingua Sign is an application developed to help people who want to learn and understand sign language at an early stage. Sign language is a means of communication from the disabled or known as "People with Disabilities". However, Malaysian society is lacking exposure to Sign language. Some of them try to learn but have limited search resources. Using this application platform can help users easily find complete information. This also gives exposure to fewer people knowing about sign language.

Key words: mobile app, mobile learning, disabilities, sign language

Introduction

Sign language is communication skills that use hand movement, body movement, and lips to give information and meaning from the speaker. It is not limited only to those with disabilities (Nirmala, 2017). Everyone can learn it. It was universal learning towards all of the age from younger to older. According to Khairul, (2020) exposure to Sign Language indeed must be given from an early age. In general, sign language is more focused on the field of education such as school or university students. These sign language courses are also widely available in schools and universities so that the learning materials also need to keep pace with technological advances. As students also need readily available learning materials. When we learned sign language, we are more concerned about our surroundings. People with disabilities will no longer feel shy but more confident when they want to communicate. It will make the community more open-minded when it comes to communication. The disability community also can try to use this application because the application is universal for all people regardless of age and so on.

Content

The Pocket Lingua Sign application uses interactive media such as videos and images. Such learning also helps further accelerates the process of understanding. This application can make it easier for users to find information materials on sign language. Using this mobile application makes you know how to use numbers and alphabet using hand gestures and easy to communicate. The impact of learning sign language is that introduces you to a new culture and community. User Interface is one of the key features in the system and very important to the user. It makes a place for note, interaction, or even communication. An application chooses to show the simplicity in it. On the homepage, it provides 7 buttons with each of its functions. Users can see all the buttons inside the system. Such as Start Button, Page, Note, Number, contact us, Watch me, Info, Alphabet, and Quiz. Users can choose to open any button to start learning sign language. According to Suhaimi et al., (2019), states humans are more impressed through the result of images and visuals that are interesting to look at.
Sign language is not limited only to those with disabilities (Nirmala, 2017). Everyone can learn it. It was universal learning towards all of the age from younger to older. In general, sign language is more

focused on the field of education such as school or university students. These sign language courses are also widely available in schools and universities so that the learning materials also need to keep pace with technological advances. As students also need readily available learning materials. When we learned sign language, we are more concerned about our surroundings. People with disabilities will no longer feel shy but more confident when they want to communicate. It will make the community more open-minded when it comes to communication. The disability community also can try to use this application because the application is universal for all people regardless of age and so on.

Learning language thru applications will provide many advantages for mobile users. They can get benefit from technology as it improves day by day and always updated. Sign language not only can learn from the book but can be learned from the application. The application can teach from the start how to improve sign language. It also provides step by step learning that help user looking for the next learning. From alphabet, numbering, daily conversation to how to combine those alphabets to become a new sentence. Next, sign language also allows for them to learn anywhere, and anytime which in turn gives a unique experience for learners (Hebah, 2017). The user doesn't need to go to a bookshop or library to find it. They only need to download using the application that helps saving cost and time. The other advantage is it helps to focus on the individual learners and encourages them.

As smartphones become more prevalent and Wi-Fi being used by almost all the people around the world. This application also needed to become one of profitability for the innovation. The target of the commercial value is to become the most trusted source by the sign language and growing thru app market. It also needs to build based on a trust culture in which all the information given is trusted. Trust, creates a solid product and prompts people to post their reviews. Users will keep spreading the advantage of the usage. It is also being marketed into all of the app's stores and google play store. If the apps had much usage, we can provide more premium information in advance usage such as Quest's hand-tracking that Possible to use in learning using virtual reality. According to Setywan et al., (2017) technological development needs to take advantage of this because it can simplify and speed up time one's job while accessing. This also makes it easier for users to acquire the necessary information quickly and easily.

In conclusion, mobile phones are no longer design for only calls but it has improved in more advance functions like web browsing, apps, and so on. In educating deaf, mute people or the community this "Pocket Lingua Sign" application can teach basic knowledge of sign language. It also helps to weaken the communication barrier between deaf communities and normal people. Using mobile technology for sign language is valuable, and can improve learner's learning and communication community. The mobile learning application for sign language has become a trend in these few years as an alternative way to replace all the other way. (Hanayati, Chiam, Munirah Norfaradilla, Shahreen, 2019).
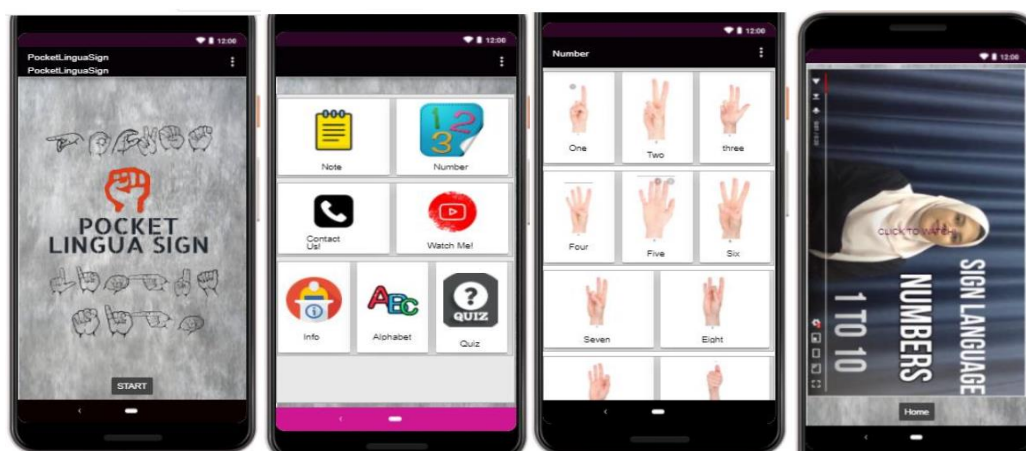
Figure 1: Screenshots of the Pocket Lingua Sign mobile app

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EDUNIA: EDUCATIONAL GAMING HUB WEB APPLICATION

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Highlights: The Covid-19 pandemic has changed the learning landscape and necessitated online learning for both formal and informal education. Thus, an Educational Gaming Hub Web Application was developed and named 'Edunia' to provide easier access and boost visibility of Educational Games that suits the learning needs of online learners of different backgrounds. Teachers may utilize Edunia as a teaching aids for their classrooms and Educational Game developers may publish their developed games through Edunia for a better reach of their audience. Commercially, Edunia can be made visible through educational institutions or any other pertinent organizations.

Key words: Educational Game, E-learning, Edutainment, Hub Application, Web App, Fun Learning

Introduction

Educational Games has been a vital part to engaging newer generations of online learners. However, these Educational Games are scattered throughout the Internet and are often obscured by their non-educational counterparts due to the latter's quantity and lack of a proper place to share the former. To solve this problem, an Educational Gaming Hub Web Application was developed and dubbed 'Edunia'. This web application was developed as a degree final year project and aims to provide online learners, including, but not limited to teachers, students and developers easier access and visibility to Educational Games that suit their needs.

Content

An academic research that was carried out as a degree requirement revealed the advantages of Educational Games led to the development of Edunia. One of such advantages stated was that Educational Games were able to utilize all the affordances offered by games while integrating educational content into the game. (Azadegan et. al., 2013). Thus, it shows that an Educational Game is a powerful tool of learning and should be made more accessible, which is the goal Edunia is striving for. Furthermore, the Covid-19 outbreak has led to a new norm – one that encourages at-home online learning (B. Shelina et. al, 2020). With Edunia, such learning is made fun which aids in the learning process and educational pursuits.

Edunia is a web-based application developed using the Django web framework that provides online learners' access to Educational Games of a subject that they want to learn which has been published by Edunia itself or submitted by an Educational Game developer. Online learner is a broad term that refers to everyone who learns online, from kindergarten all the way to university level or even anyone online who would like to learn. With Edunia, Online learners can choose their game based on their needs and interest. In addition to this, Edunia also provide teachers with virtual classroom functionality called 'EduClassroom' that allows them to create an EduClassroom, add their registered students and assign suitable Educational Games to them. Edunia also provides a way for Educational Game developers of any background to publish and let Edunia advertise their Educational Games to reach their audience better.

Edunia also aims to create a healthy community of Educational Gamers and online learners. To achieve this, Edunia also provides social mediums such as discussion forums where online learners or teachers may utilize to contact Educational Game developers to request and suggest new Educational

Games. Being a web application, Edunia is flexible to constant change and updates, which allows for new content to be delivered over time.

Commercially, Edunia can be adopted by educational institutions both public and private to boost its visibility. Being a web-application and one to publish educational games, Edunia has multiple options of monetization through its own services and functionality. Being one of the firsts of its kind in Malaysia, Edunia surely has the potential to become a big online presence.

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HUTAN: MALAY PANTUN VIA 2.5D GAME AS A TEACHING MEDIA FOR CHILDREN

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Highlights: The implementation of home-based teaching and learning (Pengajaran dan Pembelajaran di Rumah @ PdPr) approach requires teachers to be creative in imparting knowledge in term of pedagogy, delivering online class, and teaching aids usage. This is important because, one of the biggest challenges in online learning is to keep students motivation in learning especially for children (Putri et. al, 2020). The main objective of this innovation is to provide children with a learning material entitled HUTAN to increase their learning motivation to read interactively based on game-based learning approach. In addition, the two and a half dimensional (2.5D) game will introduce the beauty of Malay Pantun through game storyline in order to promote Malay heritage to our Alpha generation.

Key words: home-based teaching and learning, teaching aid, online learning, innovation, reading, Malay Pantun.

Introduction

The pandemic condition caused by Covid-19 has shift a new paradigm of learning style to be more digital application-oriented. Not only teachers, students also need to adapt to online learning styles that involve literacy skills and influence student motivation when learning especially for primary school students. Therefore, teaching to children is challenging and teacher need to use creative methods to enhance student understanding, self-interest and self-experimentation (Wong & Jing, 2019). Looking at the interest and advancement of digital applications today, this Alpha generation have high competency in playing digital games. Digital games through game-based learning become one of a media that have brought interactive technologies into children's everyday lives that have also impacted their intellectual abilities and creativity (Ibharim et. al, 2021). The proposed two and a half dimensional (2.5D) game in this innovation is an adventure game entitled HUTAN that motivates children to learn reading in Bahasa Melayu in an exciting and interactive environment.

Background of the Innovation

Description of HUTAN: Malay Pantun via 2.5D Game

The idea of the innovation for this digital game is from the inventor's observation of the challenges faced by teachers in undergoing home-based teaching and learning via online. This is because, children seem easily bored and find it difficult to focus in a long period of time especially on subjects that require skills like reading, writing and counting. Therefore, an educational game in the form of 2.5D animation is developing based on game-based learning approach. 2.5D animation means that the

background of the game environment is in the form of 2D animation while the characters and objects are in the form of 3D. This 2.5D animated application provides a unique feel and texture to attract player attention and engage with the game. The core objective of HUTAN development is to provide an interactive media that can be motivate our children to learn reading and to introduce the beauty of Malay Pantun, our classical heritage that increasingly forgotten by our young generation.

Background of the HUTAN: Malay Pantun via 2.5D Game

The design and development of HUTAN refers to Game Design Life Cycle (GDLC) model by Heather Chandler (2010) which involves main processes namely i) pre-production; ii) production; iii) testing; and iv) post-production as shown in Table 1.

Table 1: The design and development of HUTAN.

Phase	Description
Pre-production	HUTAN is an educational adventure game that focuses on learning to read the Bahasa Melayu. The characters' features in the game are characterized by classic Malay which are shown through their clothes and names. The game environment features Malaysian forest. The method of storytelling and Pantun are used as clues (through interaction with non-player characters,.e. animals)
Pre-production	to help the players to reach the final destination (Pesta DiRaja) of the game. Game design elements such as rewards, challenges, rule and interactivity were designed to add more aspects of fun and engagement in this game.
Production	HUTAN is developing using UNITY software and all its assets was designed using Blender software. The game environment was designed in the form of 2D animation while the characters and objects was designed in the form of 3D.
Testing	A total of 20 children aged from 10 to 12 years old have tested the game using usability testing to validate the effectiveness, efficiency and satisfaction of the game.
Post-production	The final game was release after the testing phase and can be downloaded and purchased from Itch.io website.

Figure 1: Player have to read the Pantun to get the clue for next challenge

Figure 2: The final destination of the game and the collection of inventory

Important & Advantages to Education
Implementing game making project as a part of game-based learning approach which consists of curriculum suitability, pedagogical aspects, and integration of game design elements.
Assisting media for teachers to enhance active and engaging learning environment especially during the implementation of home-based teaching and learning.
Introducing Pantun through reading and game playing amongst children in order to promote the Malay culture and heritage.

Commercialization Aspects

The technology readiness level (TRL) of this game have reached level 7 (with a complete design and was tested in a real environment). The copyright for HUTAN has been filed at the Intellectual Property Corporation of Malaysia (MyIPO). As this is a desktop game, it can be downloaded and purchased from Itch.io website (pay per download), installed and be played with Internet connection. As this product focusing is in Malay Language, it can be marketed to Malay speaking countries such as Malaysia, Singapore, Indonesia, and Brunei.

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AUGMENTED REALITY AND ANIMATION TRANSFORMATION IN FUNDAMENTAL OF ENTREPRENEURSHIP FOR TEACHING AND LEARNING

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Highlights: This paper presents an e-content from selected parts of the course fundamental o entrepreneurship. The presented application highlights the advantage of using interactive web tools, animation, green screen, and augmented reality to improve the teaching and learning process. This implementation would increase digital online teaching and learning effectiveness among students facing the industrial 4.0 revolution and pandemic hits.

Key words: Entrepreneurship, Digital Content, Augmented Reality, Animation, Web Tools

Introduction

The pandemic COVID-19 impact has changed traditional learning into contemporary learning. Previously learning and teaching mostly using face to face method rather than online. However, the impact of the pandemic has changed into a new norm. The teaching and learning required to conduct in remote and online, including non-face to face and face learning.

In the era of industrial 4.0 in the teaching and learning process, usage of information technologies from web tools aims to achieve more accessible, faster and more efficient and effective knowledge transfer in education. The application of web tools interactive animations have become more and more critical. The question arises as to the reasons that have made interactive animations a vital part of modern e-curricula. This paper will analyze characteristics of the augmented reality and animation towards the application of e-content in fundamental entrepreneurship e-learning. The second part of this paper will present an effective implication use of augmented reality and animation as a tool for teaching, learning and practising in the course.

Content

Augmented Reality (AR)

Augmented Reality (AR) provides the simultaneous interaction between the real authentic environment and a three-dimensional digital overlay of hologram objects in real-time. The digital objects can be manipulated by expanding the size of the object, changing the position or location, and viewing it from any angle above, below, or 360 degrees around it.

Zappar Application has been used to be a platform for all content that developed. That includes a unique "zapcode" solution. Zapcodes make the platform scalable, affordable and flexible for the content created. Then there is an authoring and publishing tool called ZapWorks. Finally, download Zappar app, embed component (SDK) and white-label app solution for unlocking augmented content in the real world.

Animation

Animation education is an innovation that often represents a significant challenge in most disciplines in higher education. Over time, several factors have coalesced, resulting in increased interest in online teaching and learning instruction.

Powtoon is a web-based animation software that allows users to create animated presentations by manipulating pre-created objects, imported images, provided music, and user-created voice-overs. Over this, four topics for fundamental entrepreneurship have been transformed into animation to acquired visual learning for the student. Through this, the student able to empower their learning on the go.

Educational Applications

Synchronous Technologies

These tools also could use as elluminate that allow synchronous two-way communication (mainly audio, supplemented with graphics such as PowerPoint). Synchronous communication tools take advantage of improved compression technology and wider bandwidth capacity and can also be organized and managed by end-users or learners for communication. Indeed, for specific educational tasks such as learning a language, these tools provide much more flexibility than the previous generation of web tools.

Mobile Learning

Nowadays, more people have mobile phones instead of personal computers worldwide and have wireless access. The rapid expansion of wireless technology has stimulated interest in mobile learning. That condition has changed the way of delivery in education and training towards people on the move. Mobile learning has been developed in a number of ways. The simplest is the use of Really Simple Syndication (RSS) feeds to alert students to course news and information, such as the imminent deadline for the next assignment.

Open Content

Another major development has been the move to open digital content. Many established higher education institutions such as the Massachusetts Institute of Technology, Harvard University, and The Open University in the United Kingdom have made available their educational content free of charge for educational purposes. The move to more open content has several implications. Teachers and learners now have an increasing range of quality-assured learning materials that they can access, free of charge, for educational purposes. Teachers no longer need to create all their material online; learners are no longer restricted to the content and curriculum provided by the university or college at which they are enrolled.

Implications

Three major stakeholders benefited from these tools:
Students: Able to learn on the move any time and any place while getting full control or learning time and process through visual, cognitive, and effective.
Higher education Institution: Manage to provide teaching and practice empowering among the academicians and staff, providing the ability to communicate and transition information and

knowledge among the student. Concurrently outreach between promotion and marketing to establish rapport and brand among the significant stakeholder.

Government and Society: Trusted and reliable gain among them, as they play significant funding, governance, and policy implementer roles. So, higher education must keep on relevance, building sustainability development contending towards future growth industrial 4.0 and society 5.0.

Conclusion

Rapid revolution of information technology, pandemic hit, and industrial 4.0 have changed the teaching and learning environment. In particular, the new Web tools that are augmented reality and animation present a major challenge to all educational and training organizations. These tools represent a new generation of tools and a significant shift in approaches to teaching and learning that challenge the very existence of formal educational institutions. At the same time, many of these new tools can be integrated within a more structured context and provide significant educational benefits through empowering students to create and manage their digital learning materials. Above all, it is crucial not only to recognize the new opportunities that these tools offer but also to make sure that they are used in educationally meaningful ways. Despite these cautions, used wisely, those tools can help bridge the gap between academic rigour requirements and the lifestyles of modern learners.

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KOSWER SEJARAH: TOKOH PEMIMPIN TEMPATAN MENENTANG BRITISH

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Highlights: Koswer Sejarah: Tokoh Pemimpin Tempatan Menentang British merupakan satu perisian yang dibangunkan sebagai bahan bantu mengajar (BBM) guru-guru mata pelajaran Sejarah. Perisian yang dibangunkan oleh pengkaji ini berkaitan dengan topik Nasionalisme di Malaysia yang melibatkan dua orang tokoh pemimpin Tanah Melayu iaitu Tok Janggut dan Haji Abdul Rahman Limbong. Antara isi kandungan bagi koswer ini adalah peta minda, video pengajaran dan kuiz. Skop kajian bagi produk ini ditujukan kepada bakal-bakal guru Sejarah Universiti Pendidikan Sultan Idris (UPSI). Metodologi kajian yang digunakan sebagai panduan dalam pembangunan aplikasi ini adalah Model ADDIE. Manakala kaedah yang digunakan untuk mengumpul data ialah kaedah kuantitatif iaitu menggunakan borang soal selidik yang diedarkan kepada responden melalui Google Form. Seramai 21 orang responden telah dipilih secara rawak untuk menilai kebolehgunaan koswer ini. Hasil dapatan kajian menunjukkan penggunaan perisian koswer pembelajaran ini telah membantu meningkatkan minat dan pengetahuan pelajar terhadap tokoh pemimpin tempatan dalam mata pelajaran Sejarah dan membantu guru menyediakan bahan bantu mengajar (BBM) yang yang menarik dan selaras dengan teknologi abad ke-21. Jelaslah bahawa penggunaan perisian koswer pembelajaran ini dapat membantu bakal-bakal guru dan guru-guru Sejarah dalam mewujudkan suasana pembelajaran yang aktif dan menyeronokkan.

Kata Kunci : *perisian koswer, sejarah, bahan bantu mengajar*

Pendahuluan

Dalam meniti arus kemodenan kini penggunaan Teknologi Maklumat dan Komunikasi (TMK) di Malaysia semakin berkembang pesat ibarat cendawan tumbuh selepas hujan. Pelbagai perubahan telah berlaku contohnya seperti penciptaan teknologi yang dapat membantu memudahkan kehidupan seharian. Tidak terkecuali juga dengan perubahan dalam sistem pendidikan dek kerana kecanggihan teknologi masa kini. Perubahan dalam sistem pendidikan ini dapat dilihat melalui penggunaan kaedah pembelajaran berasaskan penggunaan teknologi maklumat. Pendidikan pada era teknologi maklumat dan moden ini perlulah diselaraskan dengan keperluan dan kehendak semasa. Penggunaan teknologi dalam pendidikan telah memberi perubahan kepada corak pendidikan yang lebih mandiri iaitu pengajaran dan pembelajaran yang boleh dilakukan pada bila-bila masa, berlaku di mana-mana sahaja dan oleh sesiapa sahaja. Penggunaan teknologi maklumat juga boleh dijadikan sebagai salah satu bahan bantu mengajar (BBM) untuk guru-guru. Proses PdP yang menggunakan bahan bantu mengajar (BBM) sangatlah memberi kesan yang positif kepada diri pelajar.

Penggunaan koswer dalam pengajaran dan pembelajaran adalah untuk membantu pelajar belajar dengan lebih terancang. Koswer membolehkan pelajar mengawal isi pembelajaran yang hendak dipelajarinya. Tambahan pula, pembelajaran menggunakan koswer juga membolehkan pelajar untuk mengikut arahan dan panduan yang terdapat dalam koswer, mempelajari bahan-bahan pengajaran

melalui panduan bahan bercetak atau perisian komputer. Pembelajaran menggunakan bahan multimedia seperti koswer ini berkebolehan untuk menyediakan pengajaran berdasarkan kebolehan pelajar. Bukan itu sahaja, dengan bantuan koswer juga, pelajar berpeluang untuk mengulang kaji sesuatu topik atau isi pelajaran pada bila-bila masa sahaja.

Kandungan

Koswer Sejarah: Tokoh Pemimpin Tempatan Menentang British ini dibangunkan bertujuan untuk mengenal pasti sama ada penggunaan koswer dapat menarik minat generasi muda untuk lebih mengetahui tentang perjuangan pemimpin tempatan terutamanya dalam kalangan pelajar. Melalui koswer ini pelajar akan mengetahui tentang tokoh-tokoh pejuang tanah melayu yang berjuang menentang penjajah British. Kepentingan pembangunan koswer ini adalah bagi menjadikan proses pengajaran dan pembelajaran lebih aktif serta mewujudkan suasana pembelajaran yang menyeronokkan.

Koswer ini juga dapat membantu guru mempelbagaikan proses pengajaran dan tidak hanya tertumpu kepada teknik penerangan sahaja. Selain itu, penggunaan koswer ini juga dapat mempertingkatkan kualiti pengajaran dengan menggunakan pelbagai kemudahan teknologi pada masa kini. Dengan isi kandungan koswer yang lengkap tentang dua orang tokoh pemimpin tempatan, proses pengajaran dan pembelajaran akan menjadi lebih efektif dan pelajar akan lebih mudah untuk memahami tentang tajuk ini berbanding dengan pembelajaran secara tradisional.

Koswer membantu pelajar untuk belajar dengan cepat berbanding kaedah tradisional kerana pelajar dapat mengawal pembelajaran berdasarkan kemampuan dan keperluan pelajar. Tambahan pula, koswer adalah merupakan platform yang dilengkapi dengan nota, video pengajaran, kuiz, dan latihan pengukuhan untuk mengukur kefahaman pelajar tentang topik yang diajar.

Rajah 1 : Antaramuka Halaman Masuk Koswer
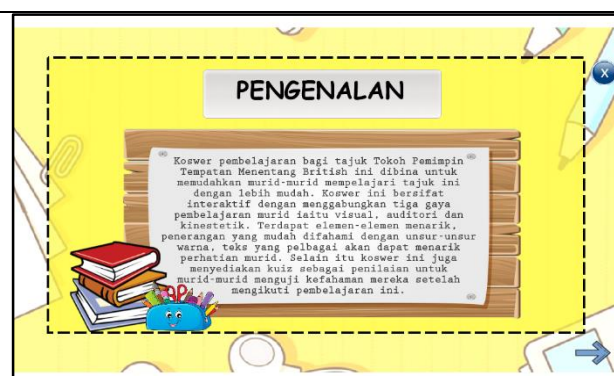
Rajah 2 : Antaramuka Halaman Pengenalan Koswer

Rajah 3 : Antaramuka Halaman Utama Koswer
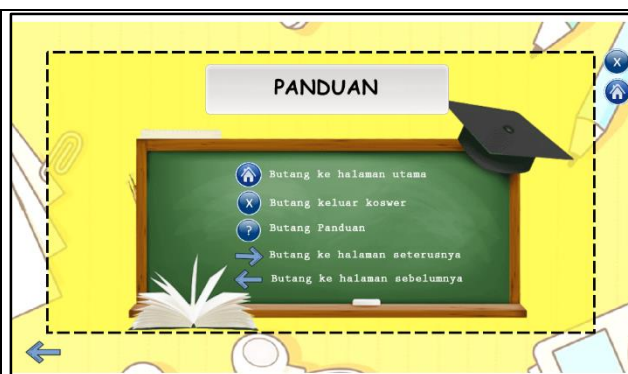
Rajah 4 : Antaramuka Halaman Panduan

Rajah 5 : Antaramuka Halaman Pilihan Tokoh

Rajah 6 : Antaramuka Halaman Tokoh
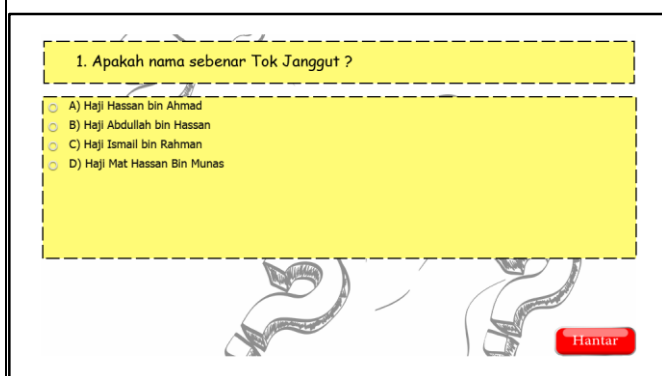
Rajah 7 : Antaramuka Halaman Kuiz
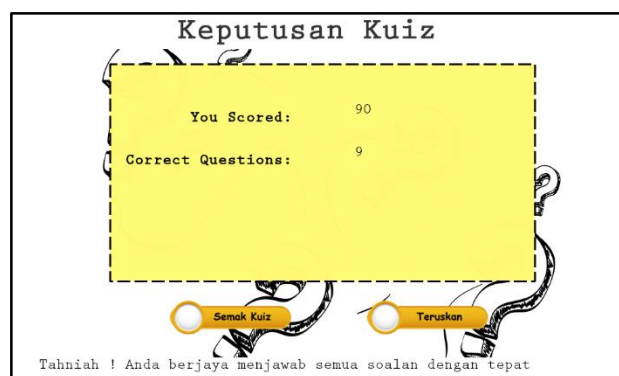
Rajah 8 : Antaramuka Markah Kuiz

Rujukan

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STRATEGY TO IMPLEMENT COOPERATIVE LEARNING IN ASYNCRONOUS ONLINE CLASSES USING E - LEARNING PLATFORM

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Highlights: A design of emergency remote teaching and learning during COVID – 19 pandemics must be facilitated with cooperative learning activity to maximized student participation and engagement for asynchronous online classes. In this teaching and learning innovation, the learning management system (LMS) call e - learning is used to implement the strategy for students to solve tutorials on electronic circuits and systems. The Jigsaw technique is used to get the learners to be involved in finding solutions for the tutorial problems given which are related to design and analysis of electronic oscillators and voltage regulator systems. Before they can upload their solutions in the database module in the E – learning system, the learners conducted discussions through asynchronous communication platforms. Quantitative data shows that a majority of the learner strongly agreed that collaborative learning to solve problems in group and virtual gallery walk in the database module are helpful for them to do revision and ask questions to experts. The qualitative data also revealed that the learners found more learning benefits after solving the task in-group. This teaching and learning strategy will benefit both instructor and leaners for implementation of asynchronous online classes.

Key words: asynchronous class, cooperative learning, online learning, student centered learning

Introduction

The recent COVID-19 outbreak brings new educational environment particularly on the delivery of teaching materials. Therefore, instructors need to be more creative in facilitating the learning, may it be synchronous or asynchronous, by providing motivating activities in a cooperative way. Cooperative learning (CL) is defined by Johnson & Johnson (1987) as an instructional method that uses small groups for the learner to work together for maximizing their learning. The construction of knowledge using CL involves five principles which are positive interdependence, individual accountability, face-to-face interaction, interpersonal skills, and group processing (Johnson & Johnson, 1998). A number of studies have shown the impact of CL on electrical engineering students. For example, Millymaki (2012) noted an improvement in learning motivation after implementing CL to advanced electrical engineering work. Thus, implementing CL for online learning is expected to positively impact students' learning motivation. This paper presents a strategy on implementing CL for asynchronous online classes to solve tutorial problems related to electronic circuits and system analysis using activities in e – learning database module. E- learning database module is a virtual platform that is used for management of course content as well as synchronous or asynchronous collaboration platform.

Methodology

The online CL presented here is implemented to 3rd year engineering students at Universiti Teknologi Malaysia taking electronic circuits and systems course. This is a service course to non–electrical engineering students. To realize the online CL using jigsaw technique, the students were divided into 4 groups with 7 members each. 7 sets of tutorial questions were set by the instructor. Each question was assigned to one member in the group who would be the expert for that question. The expert for the same question would meet up online to discuss and prepare the solution. The solutions were then uploaded to e – learning database. Once all the experts have uploaded the solutions, a virtual gallery walk was conducted for them to read all the solutions of all the questions. Asynchronous discussion between group members happened inside using the comment area for each question. The instructor will also visit the database to assist learner and clarifying their doubt.

Result and Discussion

To answer the research questions, the perception of students after this activity was gathered using questionnaire at the end of the semester. There is close-ended questions and open-ended question about the learner perception doing this activity. Figure 1 displays the result showing the student satisfaction about this activity to solving the tutorial questions cooperatively. From Figure 1, 62.5% strongly agreed that the solutions collected from this activity were helpful for them to do revision. The qualitative data indicated student learning motivation as shown in Table 1. The discussion was also helpful for the students to understand the subject matter better. This kind of activity to solve tutorial questions enable the learners to familiarize themselves with different types of questions. Apart from that, the learners found it helpful during revision because they can study at their own pace. The online CL strategy presented here is effective with proper design and planning. It can also be implemented during synchronous class using breakout rooms.
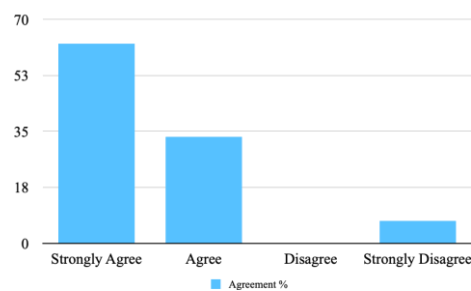
Figure 1: Percentage of student agreement about solving the tutorial questions cooperatively

Table 1: Sample of Student Excerpt Indicating Improvement in Learning Motivation

Student	Reflection Excerpt
S1	"it helps me to review the lesson content, and the discussion with my friends regarding the solution was great"
S4	"it is great because it allows us to master many types of questions"
S7	"we can discuss any problem with the group and it also encourage us to spend some time to learn
S12	"give us expertise on the question and we able to explain it to our friends"
S15	"help me a lot for better understanding"

Conclusion

This paper provides some insight on the implementation of asynchronous online cooperative learning using e–learning database to solve tutorial questions about oscillation and voltage regulator system. This strategy is found to motivate the learners as they can use the solutions provided by the expert members of their group to study during revision at their own pace. The jigsaw technique helps the learners to be more accountable in their learning. This asynchronous online CL can also be used for synchronous online classes.

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INTEGRATING ONENOTE INTO ONLINE LEARNING: INTERACTIVE MOBILE CLASSROOM

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Highlights: The purpose of this study is to implement OneNote as an interactive mobile classroom. OneNote is practically useful for quantitative courses as it offers a friendly layout. With OneNote, instructors can write down ideas, equations, tables, graphs, calculation steps etc. It also can be integrated with the mobile devices. The process of communicating for quantitative courses are challenging in digital form. Therefore, this application is one of the tools that effectively support the instructors in teaching and learning. Hence, the language of mathematics, statistics, finance and accounting can assist the instructors to deliver the information effectively.

Key words: OneNote, mobile classroom, interactive online learning, quantitative course.

Introduction

Nowadays, digital technology has become an integral part of teaching and learning process. Digital devices and applications could support and assist academicians in online teaching and learning. Despite of numerous of apps has been created but the Instructors still finds difficulties in delivering the information especially the subjects that involve calculating proses such as mathematics, statistics, finance and accounting. These subjects are called quantitative courses. In fact, the information cannot be delivered optimally during online class since it has limited interaction between instructors and students. To cater this problem, the implementation of OneNote is a good approach so that both instructors and students can have interactive mobile classroom (Patchigalla, 2019).

Description of Approach

OneNote is one of the tools that help the engagement of both instructors and students in teaching and learning. It is very convenient as it can be access on any device anywhere at any time than conventional class. According to Salman (2014), OneNote becomes one of the most powerful tools for assisting instructors and students to move away from a traditional approach to teaching and learning. In addition, the Covid-19 pandemic has caused disruptions to traditional face-to-face classroom teaching and learning. Therefore, the implementation of OneNote is very helpful as it can enhance the online class performance by assisting the instructors to deliver the information in very attractive and efficient.

Figure 1 shows the implementation of OneNote application during online class in order to enhance the interactivity of mobile classroom. An instructor conducts an online class using OneNote integrating with mobile devices that comes with pen-like stylus such as graphics tablet. Carrillo et al., (2013) studied the implementation of graphics tablet in second year thermal engineering teaching. Result showed that graphics tablet is the most appreciated teaching tool. With the help of mobile devices, it enables instructor to hand-draw images, animations and graphics, with a pen-like stylus, similar to the conventional method, a person draws images with a pencil and paper. Thus, it is no

longer constricted by the keyboard. These two well-combinations technologies are practical and convenient online platforms to be used by instructors to teach the quantitative courses. Hence, the calculation steps can be shown clearly and effectively. Therefore, the teaching and learning process is done efficiently as similar as it is done using traditional blackboards. Students can also exactly see the information written by the instructors on the screen. As a result, it can increase the concentration of students because it is like a conventional classroom environment.
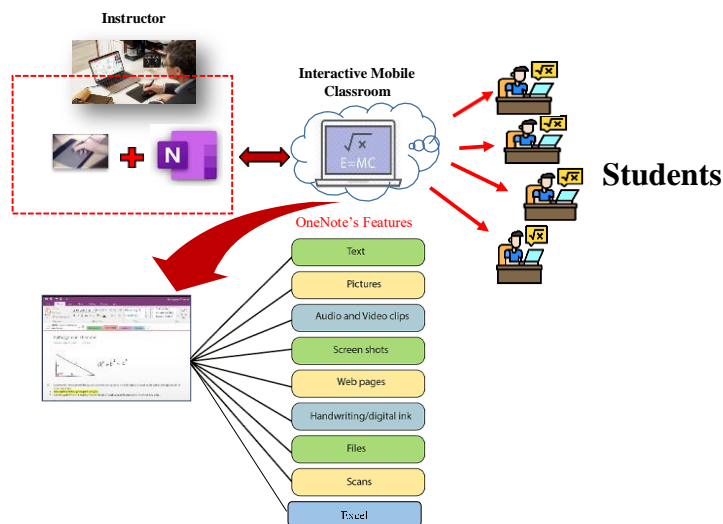
Figure 1: Interactive Mobile Classroom

The Advantages of OneNote

OneNote is functionally used as a digital platform to conduct a synchronous as well as asynchronous mobile classroom. The instructors can easily write the learning and teaching materials conveniently. Both instructors and students can easily store and access the files anytime, anywhere so that the information distribution become more flexible. Interestingly, the teaching and learning process become more attractive because this application offers lots of features. The teaching materials can be designed according to instructors' preferences such as by creating sections to organize the notes and activities. OneNote also offers the various types of file attachments such as word, pdf, excel, and PowerPoint slides. Another advantageous offered by OneNote is attractive graphics materials such as tables, graphs, colors, texts, images. Thus, the instructor can easily add graphics, links to content, recording videos and audios during the class session. The process of calculation in quantitative courses can be clearly shown as it offers friendly equations button. With the advancement of technology, OneNote is easily applied to mobile devices, so that the instructors and students can interact each other at anytime and anywhere. Indirectly this platform can be called as an interactive mobile classroom.

Innovation Impact

Table 1 indicates the result of students' acceptance test of OneNote in online class of Business Mathematics. Overall, all student agreed that it improved their understanding of problem-solving activities.

Table 1: Result of User Acceptance Test (UTAUT)

No.	Criteria	Yes (%)	No (%)
1	Usability awareness	80.6	19.4
2	Suitability awareness	88.9	11.1
3	Alternative on Mathematical Communication.	97.2	2.8
4	Friendly layout	91.7	8.3
5	Easily understand math-based solutions	88.9	11.1
6	Improves understanding of problem-solving activities	100	0
7	Increases confidence	86.1	13.9
8	Improves the quality of online learning	97.2	2.8
9	Simply to communicate mathematics	97.2	2.8
10	Practical for synchronous online learning.	97.2	2.8
	Mean	**92.5**	**7.5**

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MYURUS

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Highlights: MyUrus is a site that shows, represents and serves as a self-management system to help the communities that have a control self-management problem issue. The system provide multifunction platform and system that more kind of self-management platform for the communities during in their daily life. The purpose of this project is to develop an interactive system that help to assist time management and self-management such as system reminder, latest news, BMI calculator, relaxing song and wisdom quotes. In addition, in current days, Covid-19 pandemic a little bit have influenced in restricting communities to manage their time because the new norm have restrained people from doing their routine. As a result, communities find it difficult to manage time and themselves. Through MyUrus, we can see self-management is important to prevent the lack of skill in managing their lives.

Keyword: Urus, self-management, system, management skill.

Introduction

In this time of pandemic, we face various problems that arise due to the existence of this Covid-19 disease. Therefore, we need to take new measures or new norms to prevent the addition and also the tolerance of Covid-19 disease is spreading. Self -management is a technique that involves the rational use of temporary resources (also called time management). This technique allows achieving the best results at lower loads. We also talked about the use of efficient methods that save resources. If you take into account the goal of self -management, then it is to maximize the use of all available resources and reduce the time spent on the implementation of certain operations.

Self -management is a technique that involves the rational use of temporary resources (also called time management). This technique allows achieving the best results at lower loads. We also talked about the use of efficient methods that save resources. If you take into account the goal of self - management, then it is to maximize the use of all available resources and reduce the time spent on the implementation of certain operations among the functionality in MyUrus website is reminder system. Next, user also have an access to view the latest news if their want to know the breaking news. User also can view the wisdom quotes if they want and at all news in latest news and quotes in wisdom quotes have a link that will bring the user to the website that show the data or information detail. Furthermore, user also can calculate their BMI using the weight and height. After the calculation complete, the website will show the user the advice that already insert by admin following their user level of BMI. On top of that, user also can view and play the music that already insert by admin. So he or she can relaxing and enjoy the song. Finally, the user can view the contact, info and

send the feedback at the homepage as a guest. Figure 1 shows the homepage of MyUrus.
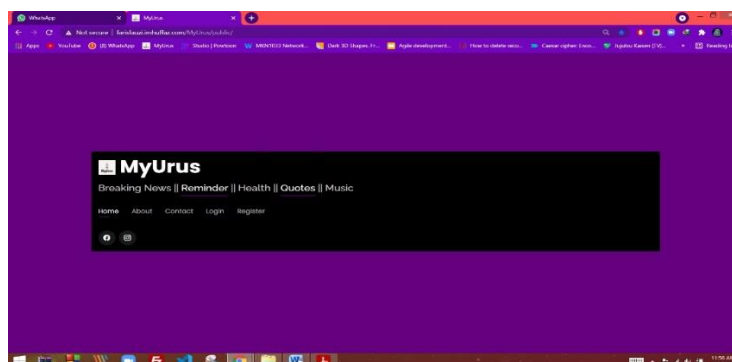
Figure 1: MyUrus Homepage

Engaging communities to the online self-management is among the keys to ensuring that communities in nowadays, always using their phone. In fact, totally human using their phone in a day is 9 hours. That why we need to develop an interactive website to help the communities manage their self. Besides, an interactive website will attract users to come back to the website. It is because, an interactive website allows users to interact and automate each visitor's experience. Designs should consider how to inspire and entice customers about products and services. Let them experience it first hand with games, videos or audio that inspire them to continue the experience. An interactive website also is when you allow your visitors to do something and gets a unique response back in regards to what was triggered. Interactive websites attracts more visitors and to be more engaged with the website. As they become more engaged, their trust and interest grows, they will more likely become a paying customer.

We will make a quick research before all comes down to begin thinking about design, development or anything else by making some websites as references to come up with ideas. Figuring out the best ways we can deliver information to the user. This website management system is very important to the students because it helps the students to manage various things such as the time that the students will spend. Among the functions created in the self-management website system called MyUrus is, reminder facilities provided so that students do not forget important things. Next, the Body Mass Index (BMI) calculation facility is also given to students in order to ensure that the body remains healthy and fit, as the saying goes "healthy body, fit brain". Finally, in this system is also provided, new news and also information about learning so that communities do not miss the new facts.

The methodology used for this project is Waterfall Methodology. Waterfall methodology is all about structure and moving from one phase to the next, so breaking your project into milestones is a key to any waterfall plan. In the Gantt view, create phases and milestones to break up the project. Using the milestone feature, determine when one task ends and a new one begins.

The MyUrus system was developed based on several problems faced such as the forgetfulness of some communities and also failure to manage time. In addition, the community also lacks the knowledge about the latest news. Furthermore, some communities have less self -motivation and trouble filling their free time. Therefore, the objective of the study to be achieved is to identify, develop and test the MyUrus system in order to solve community problems in the future.

Important to Education Purpose

This MyUrus website system has many objectives as it is built to help the community in self and

time management. In addition, MyUrus is also built in line with the latest news platforms to ensure that users can increase their knowledge on current issues. Finally, MyUrus also helps the community to increase the spirit or self -motivation of people who face the problem in lack of self -motivation or depression.

Advantages

The advantages or benefit to communities from the system are attractive design, informational and relevant content. The system will give a permission to user to view all the content in MyUrus website that already provided such as latest news, wisdom quotes and relaxing music. The unique from this is the user can play the song that have in MyUrus website. However, admin can delete, update and upload the song whatever he or she want. Other than that, MyUrus website also provides the feedback section, so the guest or user can give their feedback and comment about this website. Besides, every feedback that already send from guest or user to admin will appear to feedback section in admin menu. So admin can view all the feedback and admin can upgrade or renovate the website to the better performance.

Commercial Value

Users have free access to the MyUrus website, which they can use for free. The system is user-friendly, and the background design is interactive, which can entice users to use the website. This website platform offers online courses and materials to students of all ages. The system provided an easy and quick tool for accessing the system from anywhere and at any time by using your phone, tablet, or computer online via any web browser such as Google Chrome, Mozilla, and Internet Explorer. MyUrus can also be accessed by Android, Windows, MacOS, and iOS users. This web-based platform uses adaptive learning technology to deliver personalised educational content. There are now many educational websites that receive a large number of visitors who return on a regular basis to study online.

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APPLICATION OF GAME-BASED LEARNING IN MULTIPLE-CHOICE CONTROL STRUCTURES

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Highlights: Multiple Choice Control Structures is one of the topics in syllabus of Basic of Computer Science Form One. A game-based learning of this topic is to help teachers in teaching and learning session as well as students in understanding the topic of Multiple-Choice Control Structures. It can be used by the educators as a teaching tool since Multiple Choice Control Structures is applied in most syllabus of Computer Science in school where the teachers and students can achieve the learning outcome better.

Key words: *game-based learning, multiple choice control structures.*

Introduction

Application of Multiple-Choice Control Structures is a topic in Form One syllabus for Basic of Computer Science (Asas Sains Komputer) subject. Based on this topic, the learning outcome should be the situation students can implement the multiple-choice control structures in creating a game. Nevertheless, most of the students failed to implement it based on the topic above. Teachers play an important role where the topic taught to students has achieved its learning outcomes. Hence, teaching aids are very vital in order to deliver the knowledge better. Game-based learning is very approachable in 21st century because it enhances the students interests actively. Game-based learning (GBL) positively affects knowledge acquisition, motivation, and engagement (Perrotta, Featherstone, Aston, and Houghton, 2013). Interactive, engaging, fun, immersive, personalized learning, and reliable assessment allow learner to participate actively and continuously in learning (Ansari et al., 2014), thus improve learning outcomes.

Product Development

Application of Multiple-Choice Control Structures with gamification developed based on Agile Development which consists of six phases. The software used to develop the game is Tynker. Tynker is a tool which can be learnt to code by "click and drag blocks". It is a basic step to learn code and it is suitable for school students to learn. Based on the topic, six game have been created from simple to intermediate level based on the learning objective and student's level in order to understand the game. A website is created using wix.com to navigate the teaching aids in one platform. The other teaching aids that have been developed are quizzes based on the six games created, short notes for the

students and notes for the teachers to be used when teaching and learning sessions by downloading the Powerpoint. Quizzes are created in "Kahoot" because it is a good quiz creator which helps in teaching and learning sessions and enhance the significance of 21st century learning.

Background of the project

Changes experienced since the creation of the European Higher Education Area have generated new educational formulas geared towards active and dynamic learning designs and teaching methods that are student-centered and linked to the availability and use of technologies that can be integrated into the classroom. Some teachers and education policies interested in introducing innovative strategies have not hesitated to add video games to the long list of possible tools and resources (Gómez 2014). The NMC Horizon Report: 2014 Higher Education Edition (Johnson et al. 2014) identifies the emerging technologies that are bound to have a significant impact on learning, teaching and creative thinking in higher education. Therefore, a game-based learning is created to students in order to increase their understanding for the respective content learning and interweave learning activities to make it enjoyable and educationally effective at the same time and as teachings aids to the teachers.

Importance to education

Acting as a teaching tool for teachers.

Encourage the teachers to enhance the application of 21st century learning in teaching and learning sessions.

Commercial Value

The game and the website can be sold to educators, learners and companies that are interested in using this product in learning session.

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LEARNING FINANCIAL MANAGEMENT USING JAMBOARD, CALCULATION AND MODEL WILL NO LONGER BE BORED

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Highlights: Teaching and learning that involve mathematical calculation and modeling such as mathematic, economic and finance require the use of a whiteboard to engage and help students understand better. However, the COVID-19 pandemic has affected traditional teaching and learning activities where the use of physical whiteboards no longer applicable. Therefore, Google Jamboard Web is one of the most effective tools for drawing and writing online that replicate physical whiteboard. It works even better since students and lecturers can collaborate during class and teaching materials in the jams can be shared through pdf documents. Thus, this study assesses the effectiveness of Jamboard application on Financial Management course among students of the Faculty of Hospitality, Tourism, and Wellness in University Malaysia Kelantan.

Introduction

The spread of the COVID-19 virus forced the university to explore simple, effective alternative ways to rapidly turn the current type of face-to-face lectures into online meetings. Therefore, one of the best solutions for the force-significant scenarios using free software and services is Google Jamboard App. Jamboard is an immersive smartboard where educators and students can collaborate on a virtual whiteboard to make drawings or share ideas. Jamboard used in explaining financial calculation during tutorial using asynchronous teaching approach received positive feedback from students. Jamboard as teaching tools for Financial Managament may increase student engagement and boost learning performance, thus, improve student's results, but it must be used with a clear focus on essential content.

Content

Google Jamboard functions as an interactive smartboard where lecturers and students can work together on an online whiteboard to create sketches, brainstorm ideas and answer questions. In Jamboard web application, lecturers can write, and draw using a stylus with several different colors, insert images, drag and resize text and images. Lecturers can share the jams in synchronous online class and ask students to collaborate. Or share the class materials in the jams for asynchronous class. Up to 50 students can collaborate and work on a jam at one time.
Google Jamboard web provide several advantages for online teaching especially on the layout of the screen with a small toolbar on the left side to reduce distractions, ability to create multiple pages inside a single jam, and enables others to get feedback on their work in a smoother, more dynamic interactive environment. Additionally, Jams can be downloaded as PDF documents and together with the Jam, links can be uploaded to the classroom course materials at the end of each lecture. Example of a page on the Jam is shown in Figure 1.
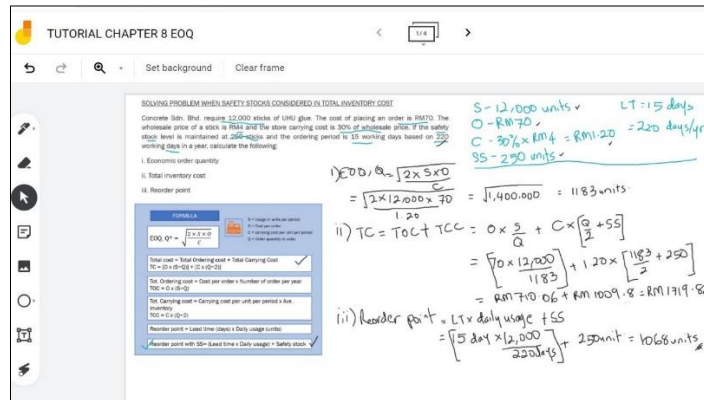
Figure 2: Example of a page in a Jam for Financial Management tutorial

Jamboard web app had been used as teaching enhancement tools for Financial Management course for students in the Faculty of Hospitality, Tourism, and Wellness (FHPK) during Movement Control Order (MCO). Using both synchronous and asynchronous method for teaching and learning this subject, lecturer recorded her lessons consist of two-hour lecture and one-hour tutorial class per week. This course consists of 9 chapters with 6 calculation chapters. A drawing pad and a stylus pen are used for the ease of using the Jamboard app. Ability to draw on top of the picture enables the lecturer to show students what to look for when solving a problem.

Using Jamboard in financial management class received positive feedback from the students for few reasons. First, because it resembles traditional whiteboard where the lecturer can easily explain the calculation step by step. Secondly, multiple pages allow solutions for several problems to be conducted without deleting the previous one. Finally, students able to repeat learning through the PDF documents and recorded videos to fully understand the tutorials and able to do the calculation by themselves.

The effectiveness of using Jamboard reflected in the better achievement for the students during MCO compared to face-to-face teaching without Jamboard. Figure 2 shows the comparison between the overall grade in semester September 2019 (245 students) prior to online class and semester February 2020 (279 students) where online class is using Jamboard web app. This is in line with several studies that show a positive connection of interactive whiteboard usage with student achievement (Marzano, 2009; Ng et al., 2020; Smith et al., 2006). Jamboard as teaching tools could enhance student engagement and improve student's result on condition that lecturers provide a quality content.

Google Jamboard web app is not only useful for teaching and learning enhancement but also for collaborative and interactive business meetings and training. Jamboard can enhance learning for various other courses besides mathematical and calculation subjects. While businesses can add value by improving meeting culture, engaging remote staff, and improving cost since the app is available for free.
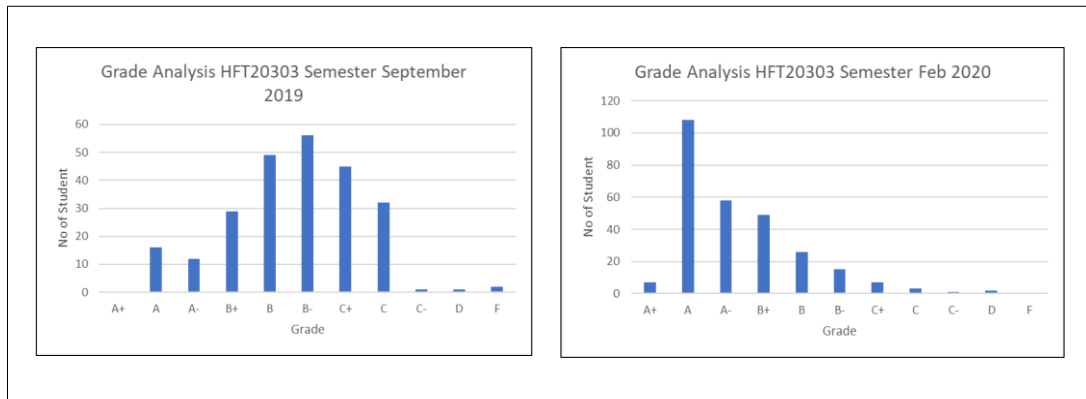
Figure 3: Comparison of Financial Management student performance in semester September 2019 and Februari 2020

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IMMERSIVE VISUALISATION OF PYTHON CODING USING VIRTUAL REALITY

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Highlights: Virtual reality" (VR) is the evolution of the computer science field which combines the real-world and computer-generated data (Leeming, 2018). Numerous virtual reality projects have been applied into the education system to ease and create more realistic learning environment for the students (Yang, 2014).

This project is mainly focusing on teaching and learning basic Python coding skills for university students who are struggling to learn coding. The VR environment is implemented to create an alternative platform for university students to learn basic Python coding skills and apply them into their real-life situations. The project findings show superior results compared to traditional methods.

Key words: Immersive Virtual Reality, Education, Programming Learning.

Introduction

Over the past decade, virtual reality (VR) technology is no longer a strange term and it is widely studied by many researchers (Alexander, Westhoven, & Conradi, 2017; Freina & Ott, 2015; Tieri, Morone, Paolucci, & Iosa, 2018) in various aspect. "VR is the biggest brain tool that we have", says Kevin Kelly, founding editor of Wired magazine. An artificial environment created by this emerging technology is immersing into many fields especially education and training (Hirt & Beer, 2020). For instance, VR can be used in medical studies to help the students for better understanding in the structure of the human body or in scientific studies to facilitate the scientist for research analytics.

The main goal of this study is to develop a mobile VR application to conduct basic Python coding skills for the students. Thirty students aged from 18 to 22 are invited to participate in this research. Unity 3D is used as the application development tool with Mobile Application Development Lifecycle (MADLC). The developed VR application is employed using Google cardboard to create immersive VR experience. Usability test, hypothesis test, presence questionnaire (PQ) and system usability scale (SUS) are utilized for evaluation of the study.

Background of the project

Well-known information is that there is significant progress in technology, and programming is one of the main factors that make evolution possible. Based on the statistical analysis done by Emsi which is a labor market insight company from January 2016 until February 2017, there were 115,058 software developer recruitments each month, but the average monthly hires were only 33,579 people (Hyndman, 2017) which is only fill up around 30% of the job posting. This result indicated that the demand for software developers is outweighing the supply. Therefore, programming knowledge is becoming crucial in pursuing a related career. Apart from disciplines like Computer Science, many of the courses offered in the university started to include programming as one of the optional or core modules for undergraduates as well.

A research done by Chandramouli, Zahraee, & Winer (2014) is using VR platform to conduct the programming lecture to the engineering students aiming to motivate them in learning programming. The results show that the 3D visual approach in VR learning helps undergraduates to resolve the inherent barriers that may be encountered due to the lack of logic and complexity in learning programming. This approach inspires them to master and analyze programming using real-world examples as well as game-oriented instructions. Overall, the performance of the participated undergraduates in the programming related course has been enhanced.

This research work presented in this paper focuses on design, development of system that allow the student to learn programming languages through immersive VR. Python is chosen as the representative case in this present work as it is one of the most demanded computational languages in 2020 (Kamaruzzaman, 2020).

Methods and Findings

Successive Approximation Model (SAM) instructional model will be used in design and development of new media for learning the phyton coding using virtual Reality. SAM is a rapid instructional development technique consisting of 3 phases including preparation phase, iterative design phase and iterative development phase (Allen & Sites, 2012). The descriptions of these phases are provided in the appendices.

The development of the virtual reality application is involving three main phases which are story-boarding, low fidelity prototype and system development using the Unity3D software. The explanation of each phase will be discussed in the following subtopics.
Story-boarding

A storyboard is used to create a design of the proposed system. This includes the user interfaces, interaction and the overall flow of the system.
Low fidelity prototype

To create a low-fidelity prototype, a paper based will be used before it is transform into digital prototying such as mockingbots and other low fidelity protyping software. The main purpose of this phase is to create a visualisation of the environment before it can be transform into high fidelity development stage. Researchers will incorporate the learning material to ensure it is suitable with the proposed VR design.

The design of the prototype is based on the storyboard and the available objects that can be developed in the Unity3D software.
Virtual reality environment development

The immersive visualisation application for python coding will be fully developed using the Unity3D software. From the earlier phase of the development until the rendering and built the application, there are steps that need to be followed and taken. Firstly, the Unity3D application need to be set to Android-based system developer, where the settings will fix a minimum Android version required. This also will allow two screen view, the right and left eyes for the Google Cardboard or any VR set hardware.

The system development in the Unity3D software involved numbers of main components which are to develop the 3D environment, which are pointer, button and interaction. The environment and model selection are based on the availability of the asset in the Asset Store Unity3D and the compatibility of the asset with current version of the software. The theme and selection of the objects in each component are done by referring to the user interface guidelines to meet the need and requirement of the targeted users.

VR application will have different features for the students to learn python. The students are able to visualise the code in 3d and at the same time they can interactively learn about the code.

In this research, pretest-posttest design in which the dependent variable is measured once before the implementation of developed application in learning and once after it is implemented. This design subjects experiment likely as each participant is first tested under controlled conditions followed by under treatment conditions. The reason for conducting pre-test is to ensure that there is no prior knowledge in Python programming within the group. The participants will be divided into two control groups in which one group uses the traditional python learning method while another group implements the VR application in python learning. Learning material given to both groups are the constant variable of the study.

The flow of data collection procedure is shown in Figure 1.
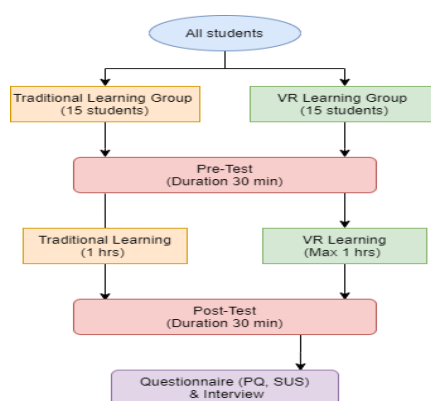
Figure 1. Flowchart of data collection procedures.

The findings from this study proved that learning through VR has better performance compared to traditional learning method. In hypothesis testing, VR learning method suggested more effective learning with t_statistic value 4.992 which much larger than t_critical=2.76. There are 73% of the participants rated above 68 out of 100 which indicated the participants are satisfied with the application used to learn Python. In short, VR method is convenient and is a modern tool for learning at any places as it provides good experience and interesting method for participants to learn. Further explanation is provided in this paper to prove the efficiency of VR for the programming learning.

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V eARabic-KAFA: THE DEVELOPMENT OF AN AUGMENTED REALITY APPLICATION FOR LEARNING KAFA ARABIC VOCABULARIES

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Highlights: ARabic-KAFA is an augmented reality application designed and developed for the use of both teachers and students at KAFA institutions for teaching and learning KAFA Arabic vocabularies. This augmented reality application is a marker based tracking tool through the use of designated flashcards. The development of this application deploys multimedia elements of 3D virtual characters, character's sound and vocabulary pronunciation that aims at assisting students' memory retention and imitation of vocabulary pronunciation.

Key words: Augmented reality, Arabic language, Arabic vocabulary, KAFA

Introduction

The use of augmented reality in education has been on the rise in recent years to bring improvement in pedagogical approach especially at the primary level. At Quranic and *Fardhu Ain* Class (KAFA), Arabic language subject is one of the compulsory subjects taught at this institution. The mastery of KAFA Arabic vocabularies among students is very important to be tackled earlier at this primary school level in order to create a better outcome for the whole process of Arabic language teaching and learning (Rahim, 2009).

However, issues pertaining to Arabic language proficiency among students is still poorly achieved and this is related directly to Arabic vocabulary acquisition (Noor et al., 2016). Therefore, researchers found that the use of multimedia technology like augmented reality for this particular purpose has a promising potential to support students' vocabulary acquisition and their motivation to learn Arabic in a more interactive environment as its edutainment concept promotes student's self-directed learning (Majid et al., 2015).

Arabic teaching and learning through augmented reality is widely used to provide a better experience for teachers and students at various level of Arabic language education (Al-Hassan et al., 2020). Munsyi & Aljojo (2020) supported that multimedia elements used in augmented reality that include graphics, animation, videos, and 3D object are able to strengthen their language skills and indirectly transforming their learning process from the memorization routine to an active learning (Elgamal et al., 2018)

In order to obtain a very impactful success from the use of augmented reality technology in KAFA Arabic vocabulary teaching and learning, the development of a well-structured and configured multimedia application is necessary to avoid mistakes and problems that might occur and disturb the utilization of this augmented reality application throughout the learning process.

Content

ARabic-KAFA application is based on the design and development research which has completed 3 main phases; analysis phase, design and development phase and testing phase. Analysis phase took into account problems, processes, ways of operating as well as solutions for ARabic-KAFA application by using both computer and smartphone with specific specifications. Prior to design and development phase, a need analysis has been conducted among 285 KAFA Arabic teachers and 10 KAFA standard 5 students in Kelantan. They are in need of using Arabic vocabularies from KAFA syllabus under the Department of Islamic Development of Malaysia (JAKIM) as the main source for teaching and learning materials.

The design and development phase includes designing storyboard with appropriate user-interface. The software used for the development of this augmented reality application were Unity, Vuforia, Blender, Adobe Photoshop and Adobe Audition. Some additional features have been added to application such as background music for main menu screen to stimulate user's stimuli through fantasy element as well as sound for some characters that are suitable for sound effect to give an impact for student's interest and motivation. As this application is a marker based augmented reality, 28 flashcards are used as markers and when the camera captured the character's image on the marker, 3D image will automatically overlay on that particular marker. Figure 1 below illustrates the main menu screen for this ARabic-KAFA application.

Figure 1: Main menu screen of ARabic-KAFA

For the testing phase, ARabic-KAFA application was functionally evaluated using some technical test to assure all software functions are operating accordingly with specific functional requirements. The test incorporates the functionality of main menu screen along with background music, audios, all clicked buttons, angle camera scanning, camera distance to the marker scanning and lighting level for a good scanning.

This ARabic-KAFA application has its own potential to be used widely for entire KAFA institutions especially those under the management of JAKIM and that because of the learning materials in this application are selected from their own syllabus. Teachers and students are the most targeted group to gain the utmost benefit from this application as the employment of such technological tools at KAFA institutions remain scarce and far from

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IPS: SOLAT KNOWLEDGE GAME

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Highlights: The Solat Knowledge Game (IPS) is a 3D digital game with an educational concept that aims to expose students to the knowledge of praying. The game genre is in the form of exploration and learning, and the game uses a 3D interface to increase students' fun and interest in playing. The fundamental knowledge of prayer in this game can be understood and learned when students can meet the challenges they encounter in the game. In addition to the use of interesting player characters, this game also has advantages of different game environments and an interesting storytelling plot. This game is also suitable for use in Islamic Education as a teaching aid.

Key words: solat knowledge, digital game, 3D game, teaching aids, Islamic education

Introduction

Islamic education is an important and compulsory subject for all Muslim students from kindergarten, primary and secondary school. It covers Aqidah, Shariah, Morals, and general Ibadah and guidance in daily life. The teaching and learning of Islamic Education in the 20th century is boring and uninteresting. In line with 21st-century learning, digital games can innovate technology in education, delivery strategies, and content learning presentation.

Today, the rapid development of various technology platforms such as personal computers, smartphones and tablets in multiple sizes makes access to digital games increasing and widespread and can be utilized by all ages and backgrounds (Entertainment Software Association, 2020). The game is a structured context with certain rules that allow players to overcome challenges to achieve the ultimate goal of victory. Digital games provide players with an engaging and motivating environment. Digital games also allow players to learn from their own mistakes and gain experience when facing challenges tailored to the player's competence.

The use of digital games is also becoming more widespread in various fields, including education. Among the advantages of using digital games in education is facilitating learners' holistic understanding, obtaining cognitive abilities, providing flexible learning, and improving learning outcomes (Zhonggen, 2019). In addition, the use of digital games can help teachers diversify their teaching methods to provide a learning environment that attracts students and challenges by using game elements in learning. Thus, the use of digital games that use a 3D interface is practical and useful for the teaching and learning of Islamic Education subjects to attract students to learn about solat.

Content

Solat is an important foundation that needs to be learned and understood in the Islamic Education subject. Teachers often teach solat in conventional ways, which makes students less interested and bored. The use of technology-based teaching aids for Islamic Education subjects has begun to be developed specifically to learn Jawi, Al-Quran, Arabic, Sirah, prayer practice, Aqidah, Hadith, and solat. However, there are still lacking, especially in the form of 3D digital games. Therefore, IPS games based on the 3D interface are developed to draw students into the knowledge of solat and motivate them.

IPS is a 3D game classified as exploration and learning games. Exploratory games are used as a form of training and environmental interactions as a key part of the game (Rego, Moreira, & Reis, 2018). Learning games use entertainment as an added value to encourage and enhance learning training (Hussaan & Sehaba, 2013). Through IPS games, learning about the basics of solat becomes more interesting and fun through activities or challenges that can increase the motivation and engagement of players.

The IPS game is aimed at users of primary school students aged seven to 12, teachers, and individuals interested in deepening the basic knowledge of solat. The appropriate use of the platform to play this game is via a tablet or personal computer. The game consists of three levels, with learning requirements and different environment at each level. The setting is jungle-shaped, sea and maze. The use of various environments will make players feel excited and arouse curiosity. In addition, the use of sound effects and background songs also play a role in affecting the player, such as the sound of sea waves, the sound of moving rocks, the sound of birds chirping and the sound when players play.

Players must also pass all obstacles with three lives in each level and answer the quiz to win (Figure 1). The quiz is becoming increasingly difficult, enabling players to confront the challenge of seeking knowledge. Therefore, if players successfully meet the challenges in the game and answer the quiz correctly, the objective of this game will be achieved.

The development of IPS games is seen as very significant nowadays, as new teaching and learning strategies for Islamic Education subject, especially on the solat knowledge. In line with 21st-century learning that emphasizes the use of technology in education, the production of IPS games will also reduce students' dependency upon teachers and enable students to learn independently, depending on their time and abilities, wherever they may be.
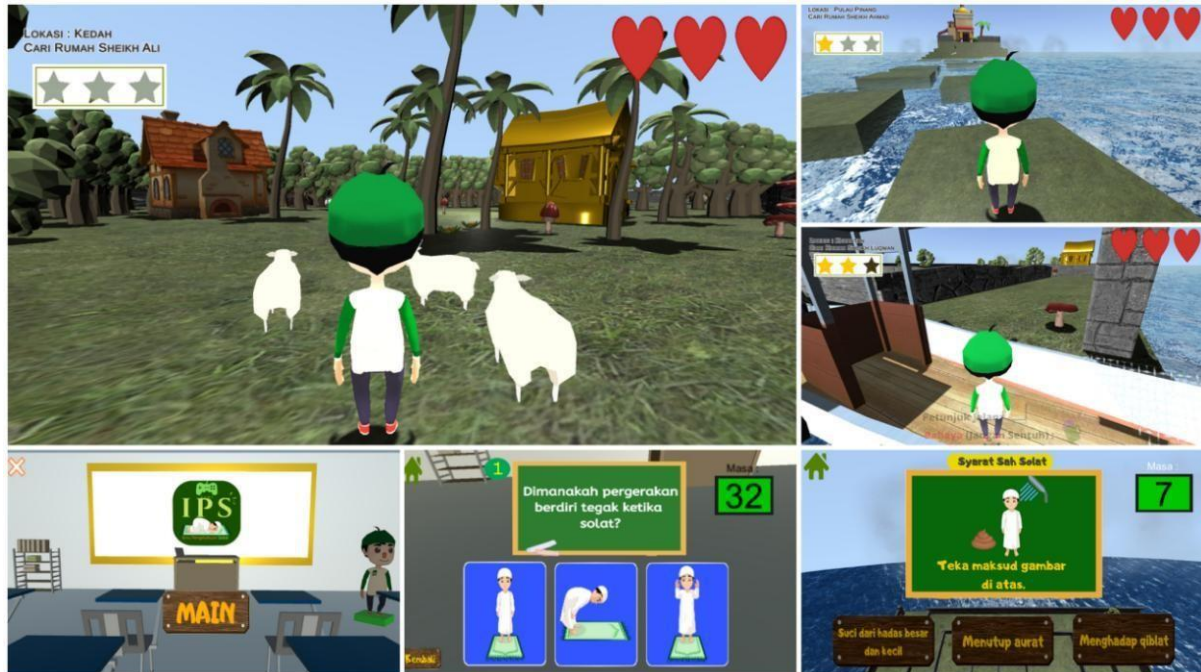
Figure 1: Game interface

Commercialization potential of the product

IPS games may be marketed for use by children, teachers, teachers and primary school students. This game also can be marketed for parents who wish to encourage their children to pray and teach them how to pray.

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HANS CHATBOT A H5N1 DOCTOR ASSISTANT FOR EVERYONE

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Key words: *Chatbot, Expert System, Natural Language Processing, H5N1 virus, medical*

Introduction

Hans is a chatbot expert system that is used to educate the general public about flu virus (H5N1). The chatbot will able to provide all the information regarding to the H5N1 virus such as spread history, prevention, symptom, cure, etc. The chatbot will also include some FAQ and simple diagnosis process. Throughout this paper, literature review are done on various types of expert system and chatbots to find the best kind of system that fit our needs. When the development is coming to an end, a survey is rolled out to public where they can use our system to identify the strengths and the weakness of the system. 30 responses is collected and most of the responses give a positive feedback to the chatbot.

Based on the information recorded by WHO, there are total 861 H5N1 infection cases and 455 death cases occurred from 2003 to 2019. (WHO, 2019) This virus manages to spread from Asia to Europe and Africa. Although the infection cases is small compared to Covid-19 but the lethality rate is very high. People who get infected by this virus normally will be dead. Although H5N1 already didn't affect much on human population, but sometimes in part of the world there few cases will be reported. This is because people still lack awareness regarding to the virus. People still raise animal no matter is for commercial purpose or pet purpose still didn't make precautions move to prevent the virus infect the animal. As example: pig which is raise for meat purpose still living in unhygienic cage. Some area not even provide room for the pigs to move around. This allows the virus easily to infect the animal and human will also get infected if they eat the infected pigs.

Apart from the low awareness from community, there is no effective vaccine or medicine that is produced until current time. (FDA, 2018) This is because the current vaccine will be no effective if the H5N1 virus strain is different from the previous virus. With the lack of funding to continue research the cure and the vaccine, there is still have chance that H5N1 will launch second assault to the world.

Therefore, a H5N1 advise chatbot system should be develop in order to educate the new generation about the virus. Besides, this chatbot also can remind the people who had endured this pandemic before that this virus still exist in this world. Eventually, all the people will aware to this virus and the risk for the 2nd H5N1 pandemic will be low.

It is a common consensus where the general public is still relatively uneducated with the topic of influenza virus even though the virus already exist in Malaysia for 10+ years. Therefore, when people caught this virus and is unsure if they should start isolating themselves or seek medical advice. Even with the availability of text online that can be easily accessed by the people, some may still struggle to get the meaning of the entire text with ease, causing further misunderstanding.

With a chat bot, suspect patient could interact with the bot to identify his/her status and receive advice on what they should do for the next step. Even when user only here to seek information for the virus, they could just use the chat bot as a source of information that is also easily consumed.

Figure 1: Shows the interface of the Hans Chatbot

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ROAD TO F.R.C:- MODERNIZATION OF MATERIALS TECHNOLOGY'S LECTURE USING HIEPS HOLISTIC APPROACH

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Highlights: Materials Technology is one of the science courses and massively loaded with facts, and theoretical knowledge. Traditionally, lecturers would highly prefer to deliver the lectures via conventional face-to-face (F2F) physical class, as to ease and smoothen the explanation as well as delivery of the contents. Nevertheless, as the higher education culture is progressively transforming into modern 'future ready curriculum' (also known as, FRC) norms, implementation of High Impact Educational Practices (HIEPs) is regarded as the most significant technique to achieve the FRC's goal. In this invention, we have implemented 'Job Interview' Approach' in HIEPs Collaborative Learning strategy, to deliver the lecture contents of Materials Technology. As for beginning stage, we have selected 'Coating Technology' for the invention. From CLO analysis (student achievement index) and course grade analysis (grade scored), we found that student performances are improved as compared to previous cohort. In future, we will then further implement this invention for others Materials Technology subjects.

Key words: Materials technology; Job interview; Collaborative learning; HIEPs; FRC

Introduction

Materials Technology is one of the science courses and massively loaded with facts, and theoretical knowledge. Traditionally, lecturers would highly prefer to deliver the lectures via conventional face-to-face (F2F) physical class, as to ease and smoothen the explanation as well as delivery of the contents. Nevertheless, as the higher education culture is progressively transforming into modern 'future ready curriculum' (also known as, FRC) norms, implementation of High Impact Educational Practices (HIEPs) is regarded as the most significant technique to achieve the FRC's goal. In this invention, we have implemented 'Job Interview' Approach' in HIEPs Collaborative Learning strategy, to deliver the lecture contents of Materials Technology. As for beginning stage, we have selected 'Coating Technology' for the invention.

The higher education is now slowly switching into Future Ready Curriculum (FRC) whereby the teaching and learning (T&L) become more flexible, broad, yet aims to produce a more robust, modern and critical thinking graduates (Brandon et al., 2008; Williamson, 2013; Reinsfield, 2020). To achieve the FRC's goal, T&L delivery methods must be switched into 'High Impact Education Practices, HIEPs' (Tajudin et al., 2019). In this regard, 'Job Interview' of 'Collaborative Learning' principle could be one of the effective HIEPs to deliver the lecture. Along the way, 'job interview' has been considered as one of the most essential tasks in talent recruitment, which forms a bridge between candidates (interviewee) and employers (interviewer) in fitting the right person for the right job (Shen, 2018). The skills of job interview must be polished ever since the undergraduate study. Therefore, the simulation of 'job interview' during lecture could help to sharpen the candidates (students)

interviewing skills. More importantly, it serves as mutual two-way collaborative learning between the simulated interviewer and interviewee. This HIEP's learning model is capable to improve student learning outcome since it does not merely require students to memorize facts and theory of the Materials Technology subject, but it also train the students to effectively deliver the contents (role: interviewee) as well as capability to assess the accuracy of the contents (role: interviewer). As for beginning stage, we have selected 'Coating Technology' subject for the invention. In order to access the positive impact of the invention, we have compared the CLO analysis of cognitive (based on student achievement index, 0 – 4.00 in FK-03) and course grade analysis of the current cohort (2019/2020) and previous cohort (2018/2020) of students. This will serve as indicator to measure the successful of the invention.

Content

The flow process of implementation of online live lecture assisted with structured mind-mapping is depicted in Figure 1. Firstly, lecturer prepares teaching slides and instruction of job interview activity for the related topic. The flow and outcome of job interview activity must be synchronized with the contents of teaching slide. Next, both teaching slides and instructions of job interview will be uploaded in E-Learning platform at least 24 hours before the lecture begin, and students will be notified accordingly. During the subsequent ongoing lecture, lecturer will firstly brief the instructions of job interview. Then, students begin taking the roles as interviewer or interviewee, and completing the job interview activity. Lecturer will act as facilitator to facilitate the job interview process. After the lecture and the associated job interview were completed, lecturer provided feedback and comment regarding the job interview activity. Finally, lecturer would summarize and wrap-up the lecture contents.

STAGE 1: Preparation	Lecture prepares teaching slides and instructions of job interview
STAGE 2: Pre-Lecture	Lectures upload both teaching slides and instructions of job interview into E-Learning platform.
STAGE 3: During Lecture	Students attend the lecture and participate in the job interview activity. Lecture plays role as facilitator.
STAGE 4: Post-Lecture (Reflection)	Lecturer provide feedback & comment regarding the job interview activity. Finally, lecturer summarize and wrap-up the lecture contents.

Figure 1: Flow process of 'job interview' approach for Coating Technology subject

On the other hand, Table 1 shows the successful rate of this invention. The successful rate is measured in terms of achievement of cognitive CLO, by looking into student achievement index (FK03) and course grade analysis. In terms of student achievement index, the index increased 0.17%, from 2.26 (2018/2019) to 2.43 (2019/2020). Meanwhile, from course grade analysis, the percentage of students scoring 'A-'grades increased from 7% to 11.8%. More importantly, the percentage of students scoring the 'C-' and 'C+' grade was significantly reduced from 2.3% to 0%, and from 11.6% to 0%, respectively. These figures indicated that despite the difficulty of lecture for the Materials Technology subject, implementation of Job Interview HIPs technique have significantly and successfully improved student performances. We are in the right trach for the 'road-to-FRC'. In future, this HIEPs teaching technique could also be employed for others Materials Technology subjects. We hope that this invention will completely overcome the difficulty and challenges of lecture for Materials Technology program, and ready for the full commissioning of FRC.

Table 1: Successful rate of the invention in terms of student achievement index and course grade analysis

CLO (COGNITIVE)	Classify the types and technique of coating technology as well as their importance in industry		Successful Rate
	Academic Session 2018/2019 (BEFORE INVENTION*)	Academic Session 2019/2020 (AFTER INVENTION**)	
Student Achievement Index (FK03)	2.26 (Good)	2.43 (Good)	**INCREMENT: 0.17%**
Course Grade Analysis			
Percentage of Students Score 'A-'	7.0	11.8	**INCREMENT: 4.8%**
Percentage of Students Score 'C+'	11.6	0	**REDUCTION: -11.6%**
Percentage of Students Score 'C-'	2.3	0	**REDUCTION: -2.3%**

Before Invention denotes "traditional face-to-face (F2F) physical lecture"
**After Invention denotes "implementation of job interview HIEPs collaborative learning strategy"*

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KIT PERMAINAN MAGNET

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Abstrak

Kajian penyelidikan dalam PdPc yang dijalankan ini bertujuan untuk meninjau keberkesanan penggunaan Kit Permainan Magnet untuk mengenalpasti jenis magnet dan namanya, serta daya tarikan dan tolakan antara kutub – kutub magnet. Teknik pendekatan belajar bermain ini dapat membantu murid-murid SJK(T) Ladang Chemor memahami prinsip asas sub topik magnet. Kajian berbentuk ini menggunakan pemerhatian, ujian pra dan ujian pos. Seramai 10 orang murid dari Sekolah Jenis Kebangsaan Tamil Ladang Chemor, Perak Darul Ridzuan dipilih sebagai sampel kajian. Hasil tinjauan awal mendapati murid masih lemah dan keliru dalam sub topik magnet. Dapatan kajian menunjukkan bahawa permainan magnet mendorong murid menjadi aktif semasa PdPc, tidak keliru malah menjadikan PdPc lebih menarik dan menyeronokkan, mencapai objektif pembelajaran (OPEM) secara mudah, dapat menguasai topik daya tarikan dan tolakan antara kutub – kutub magnet dan memperoleh skor yang baik dalam ujian. Ia juga meningkatkan kualiti pembelajaran.

Pendahuluan

Objektif

untuk mengenalpasti dan memantapkan prinsip daya tarikan dan tolakan antara kutub – kutub magnet kepada murid-murid

Untuk menguatkan daya ingatan murid-murid

Untuk membantu menarik minat murid untuk belajar dengan cara bermain yang paling mudah dan efektif

Untuk melahirkan amalan pembudayaan Pendekatan STEM (Science, Technology, Engineering and Mathematics).

Kumpulan Sasaran

Semua murid-murid di sekolah. Walau bagaimanapun, responden yang terlibat adalah seramai 12 orang murid Tahun 1 hingga 6, SJK T Ladang Chemor. Mereka dipilih kerana salah mengenalpasti dan salah menyatakan prinsip daya tarikan dan tolakan antara kutub – kutub magnet.

Latar belakang (penjelasan tentang proses penghasilan inovasi mengikut kronologi)

Berdasarkan pemerhatian di dalam kelas dan pentaksiran semasa PdPc menunjukkan murid-murid tahun 1 hingga 6 menghadapi masalah dalam tajuk Magnet. Mereka sukar menyatakan prinsip daya tarikan dan tolakan antara kutub-kutub magnet. Ini telah menyebabkan mereka tidak dapat menguasai topik itu sepenuhnya dan sukar menjawab aktiviti PAK21 iaitu Kuiz.

Oleh itu, saya sebagai guru Sains mencari idea dan cara efektif untuk responden bagi menyelesaikan masalah dalam topik ini. Kami juga ingin membantu murid-murid dengan cara yang paling mudah untuk menguasai topik tersebut.

Ramai murid beranggapan bahawa topik ini sangat susah untuk belajar. Ramai murid juga mengatakan bahawa mereka sukar membezakan prinsip penarikan dan penolakan kutub. Murid-murid juga berkata, kami hanya melihat dalam buku teks sahaja. Tambahan pula, aktiviti eksperimen dijalankan pun masih mengelirukan prinsip. Segelintir golongan murid berkata walaupun anda menunjukkan menerusi LCD tetapi kurang menguasai prinsip topik tersebut.

Daripada isu-isu ini, saya guru mengambil inisiatif menghasilkan sesuatu inovasi iaitu Kit Permainan Magnet yang menggalakkan murid menjadi aktif semasa PdPc, tidak keliru malah menjadikan PdPc lebih menarik dan menyeronokkan, mencapai objektif pembelajaran (OPEM) secara mudah, dapat menguasai topik.

Metodologi / Proses Kajian

Rekabentuk dan perincian projek, bahan dan alatan, rawatan dan prosedur yang dijalankan

Kit Permainan Magnet ini adalah suatu kit yang direkacipta berdasarkan elemen standard asas dalam PAK21. Kit Permainan Magnet ini sesuai bagi Pelaksanaan Pentaksiran Bilik Darjah Tahap 1. Namun begitu, ia boleh digunakan untuk murid-murid tahap 2, murid-murid Pendidikan Khas, pelajar-pelajar sekolah menengah untuk memperkukuhkan konep dan pengetahuan dalam topik magnet. Kit Permainan Magnet direkacipta dengan unsur PBD menerusi 5 aktiviti khas iaitu kuiz, permainan, main peranan, bercerita dan projek mudah.

Rajah 1: Kit Permainan Magnet direkacipta dengan unsur PBD

Kit Permainan Magnet ini:

- Mudah dibawa digunakan di mana-mana
- Jangka hayat digunakan panjang / tidak mudah rosak
- Bahan bbm untuk guru pelatih semasa praktikum (subjek Sains, BM, BT) 4 Elemen 4K 1N diterapkan
- Elemen STEM diterapkan
- Pengguna mesra alam (eco-friendly)
- Semua peringkat umur boleh bermain (murid, guru, guru pelatih, ibu bapa) 8 Kos rendah
- Konsep belajar kolaboratif diterapkan
- Sesuai untuk mentaksir tahap penguasaan murid 11 Diperbuat dengan bahan kitar semula

PENGGUNAAN BAHAN BUANGAN DAN KITAR SEMULA:

- Kupon Parkir yang terpakai
- Kotak kadbod
- Kotak mancis terbuang
- Kepingan aluminium terbuang
- Plastik laminasi
- Kertas warna terpakai
- Gam tepung ubi / Pita pelekat
- Warna air 9 Magnet bar

Kit ini juga boleh digunakan dengan bantuan **MANUAL KIT PERMAINAN MAGNET.** Manual ini mengandungi cara membuat semua aktiviti dengan penjelasan dan disertakan video melalui QR Code.
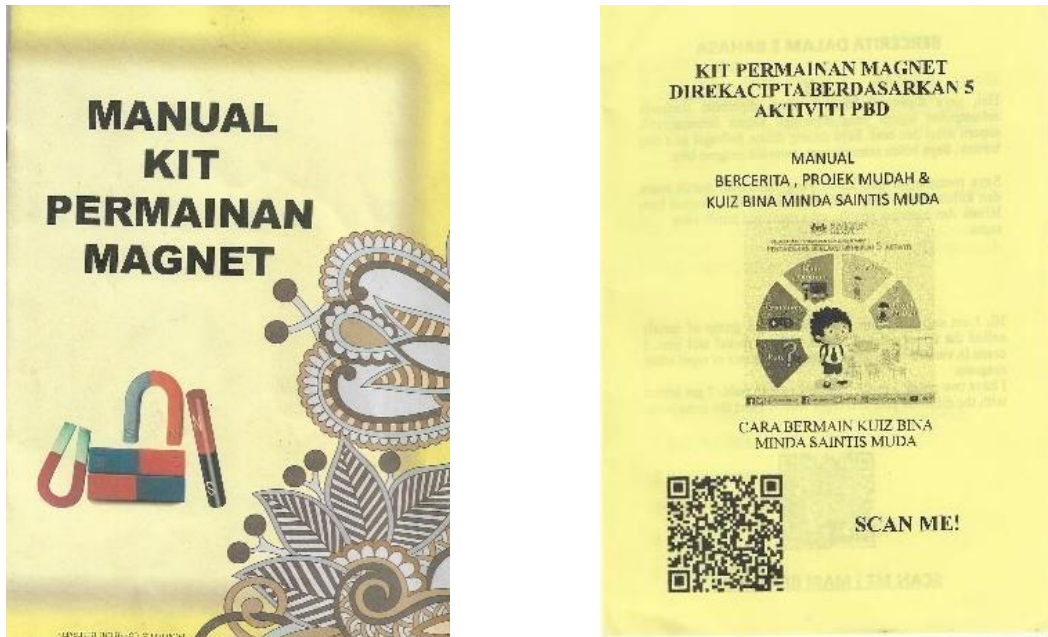
Rajah 2: Manual Kit Permainan Magnet

Huraian Inovasi

Aktiviti kit ini berdasarkan rajah dibawah yang digariskan oleh KPM.

Rajah 3

Permainan

Kit ini digabungkan dengan 3 jenis Permainan iaitu Game 1, Game 2, Game 3:

Game 1   Game 2   Game 3

Rajah 4

Cara bermain **game 1** adalah susun kutub - kutub sama dan berlainan dengan menggunakan frasa utara / selatan. Selepas itu, murid memilih dan padankan gambar menarik / menolak dengan betul.

Cara bermain **game 2** ialah susun kutub - kutub sama dan berlainan dengan menggunakan frasa utara / selatan. Seterusnya, pilih dan padankan frasa menarik
/ menolak dengan betul.

Cara bermain **game 3** ialah susunkan gambar magnet dengan kutub-kutub sama dan berlainan. Selepas itu, pilih dan padankan frasa menarik / menolak dengan betul. Cara bermain game dan jawapan bagi setiap game disertakan bersama dalam manual kit itu. Murid-murid bersama cikgu, ibubapa atau secara kendiri boleh menyemak jawapan dengan mengimbas Kod QR.

Main Peranan

Menarik   Menolak

Rajah 5

Elemen tambahan yang digabungkan adalah aktiviti berdasarkan PBD iaitu **video permainan 'Magnet Race'.** Murid dapat menonton klip video itu menerusi mengimbas Kod QR.

Kuiz

Rajah 6

Kit ini juga mempunyai **Kuiz Bina Minda Saintis Muda.** Selepas murid menjawab soalan jawapannya boleh disemak melalui **mengimbas Kod QR.**

Bercerita
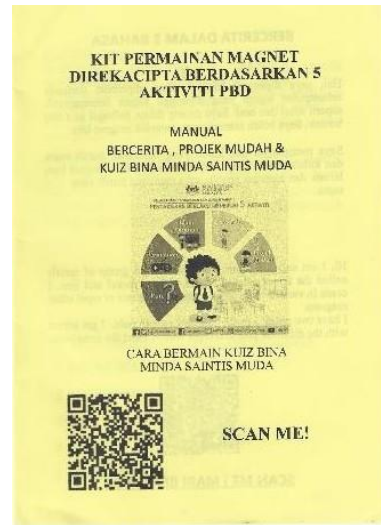
Rajah 7

Kit ini juga direka khas dengan satu **cerita pendek magnet** untuk murid-murid bercerita di sudut pidato. Cerita disediakan dalam 3 bahasa iaitu Bahasa Melayu, Bahasa Inggeris dan Bahasa Tamil. Teks cerita terdapat dalam kit manual.

Projek Mudah
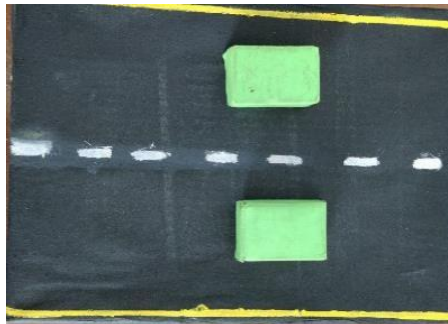
Rajah 8

Tambahan pula, ia juga disertakan dengan satu projek mudah iaitu **'Merekacipta Kereta Grab Magnet'.**

Kos Bahan

BAHAN	KOS (RM)
1. Kupon Parkir yang terpakai	TIADA KOS
2. Kotak kadbod	
3. Kotak mancis terbuang	
4. Kepingan aluminium terbuang	
5. Kertas warna terpakai	
6. kertas kajang warna hitam	
7. Plastik laminasi	3.00
8. Percetakan	2.00
9. Warna air	1.00
10 Magnet bar	2.00
11. Pita pelekat	1.00
JUMLAH	**9.00**

Jadual 1: Kos bagi Menghasikan inovasi

Manual operasi

proses kerja yang digunakan dalam pengumpulan data dan pemerhatian

Melalui pemerhatian, penggunaan kit permainan magnet bukan sahaja mendorong murid menjadi kreatif malah menjadikan PdP lebih menarik dan menyeronokkan serta meningkatkan kualiti pembelajaran. Oleh itu, PAK21 diintegrasikan mengikut kesesuaian topik yang hendak diajar dan sebagai pengupaya bagi meningkatkan lagi kefahaman murid terhadap kandungan mata pelajaran. Guru telah memilih dan melaksanakan temubual, kaedah ujian penilaian pra dan ujian penilaian pasca iaitu berupa sesi kuiz dalam menilai pencapaian murid tahun 1 dalam menguasai topik tersebut.

Kaedah Temubual

Murid-murid ditemubual menerusi sebelum dan selepas permainan tersebut. Terdapat murid memberikan prinsip dengan betul selepas permainan magnet. Jadual dibawah menujukkan temubual diantara guru dan dua belas orang murid itu.

Murid	Soalan dari guru semasa temubual	Jawapan murid sebelum permainan	Jawapan murid selepas permainan
A, C	Kutub sama menolak?	Hmmmm….	Ya cikgu.
D, F	Kutub berlainan menarik?	Tak tahu cikgu.	Betul cikgu.
B, E	Adakah kutub utara dan kutub selatan menarik?	Tak faham cikgu.	Bila kutub lain cikgu dia menarik.
G, I	Adakah kutub selatan dan kutub utara menolak?	Pusing kepala cikgu. Cikgu cakap jawapan	Ya atau Tidak cikgu.
H	Terangkan prinsip daya tarikan dan tolakan magnet?	Magnet Tarik dan tolak cikgu.	Kutub lain menarik dan kutub sama menolak cikgu.
J	Prinsip ini boleh faham ke melalui cara bermain?	Hmmmm tak tau cikgu.	Ya cikgu kami faham prinsip.

Jadual 2: Temubual di antara guru dan murid-murid

Berdasarkan temubual, sebanyak 100% murid menskor tajuk tersebut. Data dibawah menujukkan skor itu.

Permainan Magnet	Peratus Murid memahami & mengusai prinsip (%)
sebelum permainan	20
selepas permainan	100

Jadual 3: Peratus Murid memahami & mengusai prinsip sebelum dan selepas Permainan 'Magnet Race'

Penilaian formatif pra yang dijalankan sebelum permainan dan selepas permainan penilaian formatif pos. Penilaian ini dapat memberikan kesan dan padah yang bermakna. Berdasarkan data ujian formatif pos, hampir 100% murid menskor tajuk tersebut.

Murid	Skor ujian penilaian pra (%)	Skor ujian penilaian pasca (%)
A	20	40
B	10	30
C	20	45
D	35	50
E	25	40
F	40	55
G	28	44
H	15	35
I	25	56
J	38	56

Jadual 2: Skor ujian penilaian pra dan ujian penilaian pasca

Hasil Kajian

Keputusan ujian penilaian pra telah mengecewakan guru. Para murid tidak mampu memberikan jawapan yang tepat dan betul. Melalui temubual dengan murid, guru dapat tahu bahawa selepas penggunaan kit permainan magnet transformasi ilmu pengetahuan yang berkualiti telah berkembang. Penilaian formatif pra dan penilaian formatif pos diadakan. Ia meningkatkan keputusan ujian penilaian pasca secara mendadak. Guru agak terkilan melihat perubahan yang ketara terhadap pemahaman murid di mana kebanyakan mereka mencapai skor markah yang lebih baik berbanding keputusan ujian penilaian pra. Keadaan ini telah memotivasikan guru serta warga pendidik SJK (T) Ladang Chemor.

Perbincangan dan keputusan

Keberkesanan Inovasi Kepada Pdp (Sertakan Bukti)

Menurut Cara Parallel play iaitu bermain bersama-sama atau suka bermain bercampur membantu murid-murid meneroka alam yang boleh menjadikan mereka berkebolehan dalam menghadapi masalah persekitaran dan boleh menjadikan mereka kreatif. Pengaplikasian teknik bermain bukan sahaja mendorong murid menjadi kreatif malah menjadikan PdPc lebih menarik dan menyeronokkan serta meningkatkan kualiti pembelajaran. Oleh itu, kaedah atau teknik bermain ini diintegrasikan mengikut kesesuaian topik yang hendak diajar dan sebagai pengupaya bagi meningkatkan lagi kefahaman murid terhadap kandungan mata pelajaran.

Penggunaan teknik permainan magnet dalam PdP amat sesuai dan memanfaatkan warga sekolah iaitu guru dan murid dengan baik. Mengikut Dokumen Standard Kurikulumdan Pentaksiran (DSKP) 2017, pelbagai kaedah boleh digunakan bagi mencungkil bakat murid dalam matapelajaran Sains.

Melahirkan amalan pembudayaan **Pendekatan STEM** (Science, Technology, Engineering and Mathematics). Pendekatan STEM ialah PdP yang mengapikasikan pengetahuan, kemahiran danniai STEM melalui inkuiri, penyelesaian masalah, atau projek dan konteks kehidupan harian, alam sekitardan masyarakat tempatan serta global.

PdP STEM yang konstekstual dan autentik dapat menggalakkan pembelajaran mendalam dalam kalangan murid. Murid boleh bekerja secara berkumpulan atau secara individu mengikut kemampuan murid ke arah membudayakan pendekatan STEM.

Oleh itu, Penggunaan teknik permainan magnet dalam PdPc dapat meningkatkan minat murid terhadap Sains. Pelajaran Sains yang menarik akan memotivasikan murid untuk belajar bersungguh sungguh dan seterusnya mempengaruhi pencapaian dan kemenjadian murid setara dengan hasrat Menteri Kanan Menteri Pendidikan Malaysia YB Dr.Radzi Md Jidin.

Rajah 9: Kit Permainan Magnet

Rajah 10:
Murid kelas lain boleh bermain di luar bilik darjah semasa rehat

Rajah 11:
Hasil kerja murid tahun 1 dalam kumpulan

Rajah 12:
Murid bercerita dalam perhimpunan

Rajah 13
Murid boleh membuat eksperimen konsep magnet penarikan dan penolakan

Rajah 14
Murid boleh membuat pembentangan
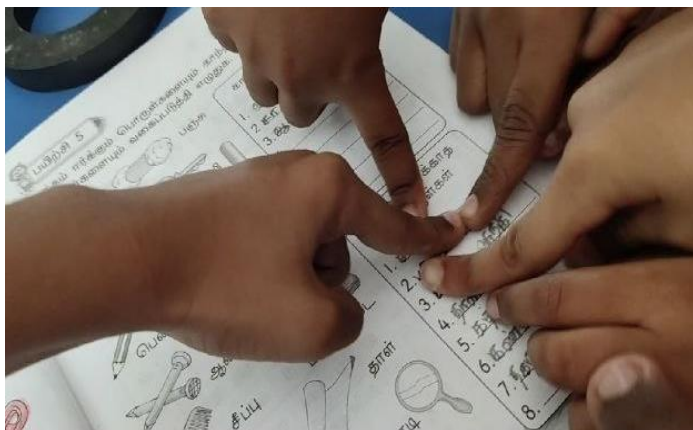
Rajah 15
Murid boleh membuat latihan

Potensi untuk disebar luaskan kepada pihak lain

Kit Permainan Magnet sangat berpotensi untuk disebarkan kepada pihak lain kerana ia boleh didaftarkan untuk hak cipta. Paling penting ia boleh diperbanyakkan dengan kos yang sangat berpatutan. Ia bersifat komersil dan boleh dipasarkan. Antaranya kit permainan telah disebarluas:

Dalam Minggu Sains, semua murid telah menggunakannya.
Guru-guru kelas lain telah menggunakan semasa PdPc Sains
Kit Permainan Inovasi digunakan semasa Bengkel Sains di sekolah lain iaitu di dalam dan di luar daerah
Kit Permainan Magnet telah dirakamkan semasa PdPc
Guru-guru lain telah berkongsi idea dan gambar dalam media massa Whatsapp, facebook, Youtube dan telegram dan memotivasikan mereka untuk menghasilkan inovasi lain
Pembentangan dan pameran peringkat kebangsaan

Rajah 16: Sudut Pameran di dalam program daerah
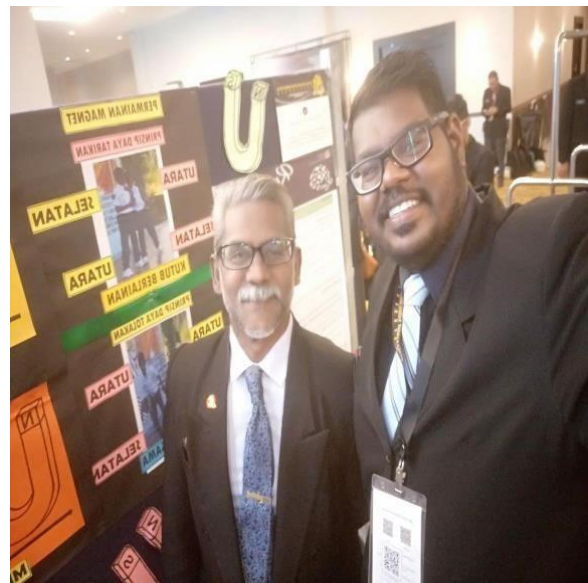
Rajah 17: Minggu Sains Peringkat Sekolah

Rajah 18: Sebar luar di sekolah lain
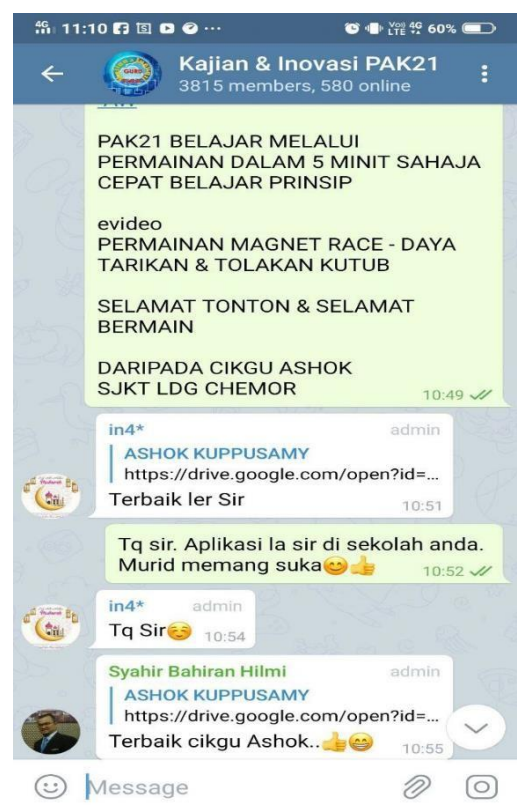
Rajah 19: Sebar luar di media sosial (telegram, youtube, Face book)

Rajah 20: Pameran Minggu Sains Negara 2019

Rajah 20: Pembentang KUBIC'19 Peringkat Kebangsaan 2019

Rajah 21: Pempamer SATI Peringkat Kebangsaan 2019

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CO-CREATING E-LEARNING MATERIALS WITH THE LEARNERS: A COLLABORATIVE APPROACH FOR THE DEVELOPMENT OF RE-USABLE LEARNING OBJECTS (RLOs)

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Highlights: Reusable Learning Objects (RLOs) are the interactive learning resources being developed to be incorporated in the teaching and learning of health-related disciplines towards digitalising and advancing the healthcare curricula in Malaysian Higher Education Institutions. The addition of RLOs in the curricula is predicted to have a positive impact in improving knowledge and organising pertinent cognitive processing requirements. This study includes a collaborative approach in co-creating the RLOs with educators, students and technologists. Positive responses were received from the preliminary evaluations of the co-created RLOs and further investigations are needed to assess their significant effect on teaching and learning in the healthcare curricula in Malaysia.

Key words: co-creation, digital curriculum, e-learning, medical education, reusable learning object, social media professionalism.

Introduction

Despite e-learning being a national higher education agenda, a survey on Malaysian Higher Education Institutions (HEIs) found that the implementation of digital learning tools remains suboptimal. Thus, there is a need to develop high quality e-learning contents and digital resources to be deployed in HEIs curricula (Atan et al., 1991; Ministry of Education Malaysia, 2015). As one of the initiatives to improve the digital learning implementation, an interactive multimedia learning tool called Reusable Learning Objects are being co-created and developed by three Malaysian HEIs in the health-related disciplines. Reusable Learning Objects (RLOs) are the interactive learning tools being developed to be incorporated in the teaching and learning of the health-related disciplines towards digitalising and advancing the healthcare curricula in Malaysia HEIs. RLOs are digital content resources with multimedia, interactive activities and assessments. Some important characteristics of the RLO are:
- Small in size (5 – 15 mins of interaction time)
- Focused on single learning goals
- Uses a mix of media (texts, images, audio, video, animation)
- In sequence of pages
- Standalone and interactive
- Co-creation led by communities

Methodology

The design and co-creation of each RLO was based on the ASPIRE methodology (Aim, Storyboarding, Population, Implementation, Release, and Evaluation) which involved the educators, students and technologists. In the Aim stage, a Delphi survey was conducted among

the end users (the students) and stakeholders (the educators) to identify needs and suitable topic areas before development. Workshops to prepare the RLO's storyboard and specification involved the students and stakeholders (both educators and technologists. This was aimed to ensure better alignment with the students' learning needs in the Storyboarding stage. Online specification of the RLO was reviewed and revised extensively by considering different criteria in the Populate stage. In the last two stages, each RLO was implemented as HTML5 web pages which are responsive to different devices before being hosted on an online repository to be accessed anytime and anywhere with the Internet connection. Adding RLOs in the curricula was predicted to have a positive impact in improving knowledge and organising pertinent cognitive processing requirements.

Case Study: "Social Media Professionalism (To Share or Not to Share?)"
Teaching professionalism to an undergraduate in the medical program is challenging due to its context-specific nature. The "Social Media Professionalism (To Share or Not to Share?)" topic was selected as one of the titles for the RLOs based on the Delphi survey conducted prior to the development. RLOs can be used to achieve learning outcomes for medical professionalism as these learning units can be reused across lessons, other courses and other similar disciplines. Thus, this topic is very suitable as one of the case studies for the co-creation of the RLO.
The learning objective of the "Social Media Professionalism (To Share or Not to Share?)" RLO is to assist medical students to distinguish between good and poor professionalism on social media platforms such as Facebook,

Instagram and Twitter. In addition to the co-creation of the RLO using the ASPIRE
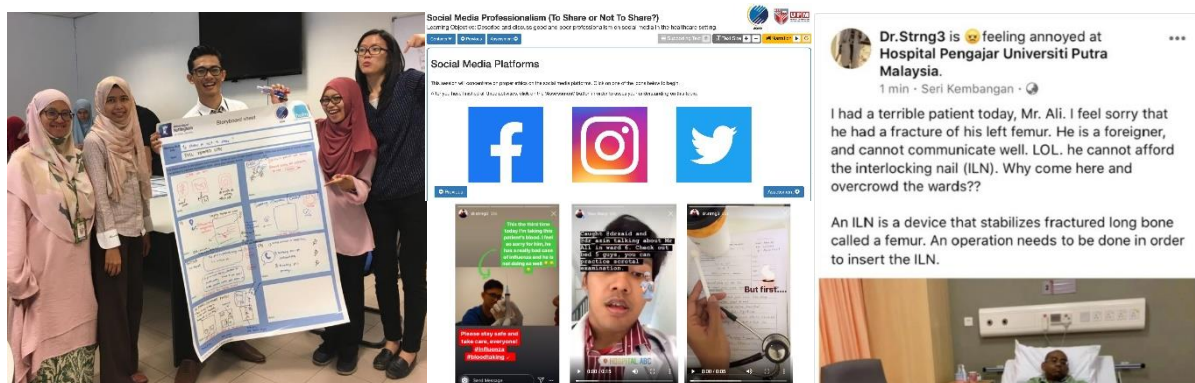
methodology, the RLO's effectiveness was also evaluated using a pre- and immediately post, and 6 weeks post-RLO usage questionnaire.

Usefulness

A total of 86 year 2 medical students completed the RLO lessons during the personal and professional development (PPD) module. A pre- and immediately post, and 6 weeks post-RLO usage knowledge questionnaire was done to evaluate its effectiveness. The range score for the test is 0 - 5, where the full mark is 5. There was a significant increased from baseline scores; pre-questionnaire (M=3.87, SD=.961) with post-questionnaire (M=4.73, SD=.565) conditions; t(84)=8.098, p=0.000, and post 6 weeks questionnaire (M=4.81, SD=.392) conditions; t(69)=7.580, p<0.001. Therefore, it can be concluded that the RLO is effective in teaching professionalism in social media platforms. The findings also indicate that the RLO has great potential in teaching and learning and its' readiness to be integrated in existing curricula. Positive responses were received from the preliminary evaluations of the developed RLOs and further study is needed to assess the usefulness of RLOs on teaching and learning in the

healthcare curricula

Value Added

Teaching and learning using RLOs was introduced as an innovative digital pedagogy method that will benefit healthcare and biomedical science students in Malaysia. The RLO developed and tested has been shown to be effective in teaching professionalism in social media platforms. The case study completed has shown the RLO as a value added approach in teaching and learning that can be readily integrated in the existing curricula.

Potential

The co-created RLOs can be shared across different disciplines in medicine and biomedical health sciences, in Malaysia and across the region. They are developed and repurposed to suit local culture and healthcare practices. Not only restricted to the healthcare disciplines, the concept of the content's co-creation can be employed by other fields such as education and engineering. The project is in line with the Malaysian national education agenda to encourage globalised online learning to enhance the quality of teaching and learning and to widen access to good quality content while lowering the cost of delivery. Other stakeholders can also learn about the topic easily, anytime and anywhere. The work is under the Creative Common (Attribution-Non-Commercial) license thus could not be used for commercial purposes.

Conclusion

RLOs are an alternative teaching approach that enhance the learning experience by having a variety of options of graphics, animations, videos and assessment tools. Students along with the educators and technologists were engaged in the process of creating the "Social Media Professionalism (To Share or Not to Share?)" RLO to allow them to share their ideas and to make it more captivating. Teaching and learning via RLOs are better than the textbook narration because they provide interactive learning between students and educators.

Acknowledgement

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ME, MYSELF AND MY PERSONALITY: EXPLORING INDIVIDUAL SELF THROUGH REFLECTIVE-CASE BASED LEARNING

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Highlights: This paper presents the development and implementation of reflective-case based learning strategy in a postgraduate course known as Psychology of Personality. The use of reflective-case based learning is aimed to enhance students reflexivity and cognitive skills which are highly valued in the era of IR 4.0. This strategy has been refined over a few semesters which taking into consideration of students' feedbacks at the end of the semesters.

Key words: *case-based learning, reflective activity, active learning, reflexivity*

Introduction

Psychology of Personality is a postgraduate course offered primarily to those who are majoring in Educational Psychology masters programme as an elective course, but it is one of the required courses for those who are majoring in Guidance and Counseling masters programme who opt for Malaysian Board of Counsellor licensing. The nature of the course requires students to not only to understand traditional grand theories of personality, but also propose insightful interpretation of personality traits based on relevant theories. Traditional approach of teaching this course using lecture and active learning activities such as Think-Pair-Share was found less effective in enhancing students understanding on the importance and applicability of various personality theories in providing explanation about personality and in specific personality traits. To overcome this issue among students who are taking this course, reflective-case based learning was introduced in 2019 and has been used until now.

Background of the innovation

Reflective-case based learning incorporates Gibb's reflective cyclical phases (1988) and case-based learning as proposed by Rosenstand (2012). Gibb's reflective cycle (1988) comprises of six cyclical phases: description, feelings, evaluation, analysis, conclusion, and action plan. Other than Gibb's reflective cycle (1988), reflective-case based learning also embeds principles of case-based learning. According to Rosenstand (2012) case-based learning involves using a case in which a work method, problem and discipline can take into any form.

In this course, cases are not specified or readily accessible rather it would be crafted based on students' personal reflective narrations which contain behavioral description of their personality traits. In short, the assignments and classroom activities which were assigned to students incorporate case-based learning principles and involve Gibb's six reflective cyclical phases.

Figure 1 and Table 1 show the steps of implementation of reflective-case based learning through assignments and activities which embed Gibb's reflective cyclical phases with case-based learning principles.

Case-based assignments:

- My Personal Sketch (reflective narration)
- Lexical analysis of cases
- Case Analysis and Discussion report (Group)
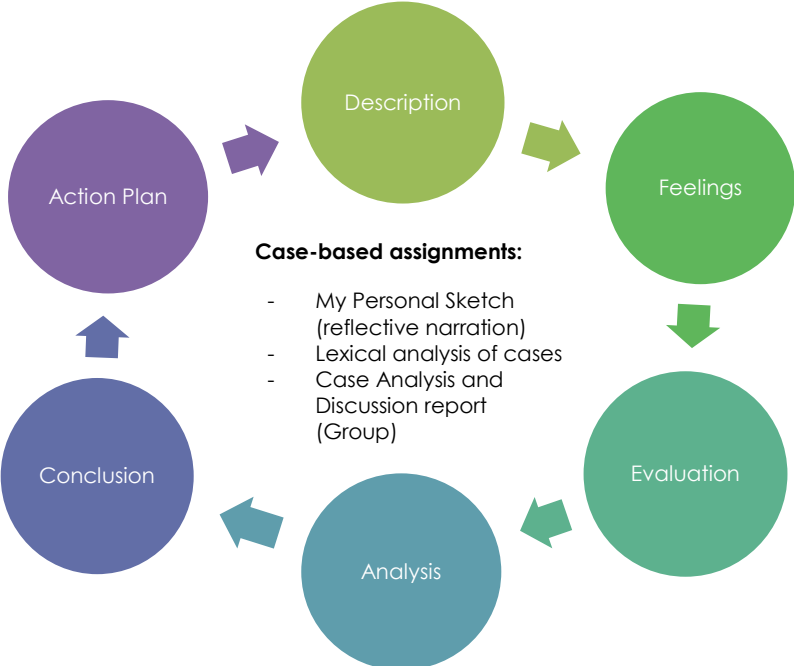
Figure 1: Gibb's reflective cyclical phases embedded within case-based assignments.

Table 1: Activity plan of reflective-case based learning for Psychology of Personality course

Gibb's reflective cyclical phase	Assignment and activity	Description
Description	**Case-based assignment** Reflective narration i.e. My Personal Sketch	An assignment called "My personal sketch" which adapted from Little (2016) studies was given in exploring students' awareness about their own selves in relation to well-being. To retain their identity, they use a pseudonym and third-person pronoun such as him or her. Students have a choice either to write in Malay or English. The narrative essay must include the most defining personality traits that they perceive they have which other people have mentioned these traits to describe them. In addition, students need to embed their views of their personal development from childhood until current state in relation to their personality.
Feelings	**Reflective activity** **Active learning**	After submitting the "My personal sketch" assignment, students were asked about their feelings as they completed the assignment and share their feelings in Jamboard. Questions such as "What were you feeling when you write the narration about yourself?", "What were you feeling when you were asked to share your narration to others even though your identity is unknown to others except to the instructor?" and such.
Evaluation	**Reflective activity** **Active learning**	In evaluation phase, students were asked to evaluate their experience of writing a narration about themselves by highlighting certain behavioural description of their personality and situations they have dealt before which can be related to their personality traits. Students were given questions such as "What went well or bad when you describe your personality narratively?" and "How do you feel knowing your personality traits relate to the way you deal with certain situations?" to guide their thinking. Students shared their thoughts in Padlet.
Analysis	**Case-based assignment** Lexical analysis Case analysis and discussion report	The lexical analysis is meant to assist students to codify behavioural description of personality traits into categories based on relevant theories. Using the findings from lexical analysis and scores from personality inventories such as Ten Item Personality Inventory (TIPI) by Gosling et. al. (2003) and other personality inventories, students wrote a case analysis and discussion report with detailed explanation about their analysis of their personality traits with reference to relevant personality theories.
Conclusion	**Reflective activity** **Active learning**	Based on the "My personal sketch" assignment and lexical analysis, students were given a question to think about their current situation. Questions such as "What do you learn from knowing your personality traits in helping you to cope with the stress that you might face due to COVID-19 pandemic?", "Knowing on your personality traits, else can you do to cope with the current situation?" and such were

		used to guide students' thinking. Students shared their thoughts in Padlet.
Action Plan	**Student Evaluation of Teaching (EPPP)** **Self-reflection survey**	At the end of the semester, other than the usual student evaluation of teaching or EPPP (*Penilaian Pengajaran Pensyarah*), students were also given a survey with open-ended questions such as "If you are given the same kind of assignment i.e. My personal sketch assignment, what would you do differently?" to evaluate their learning experience taking Psychology of Personality course.

Importance of applying reflective-case based learning

Understanding one own self is important for personal well-being. Knowing our personality traits and appreciation towards various personality theories that explain personality in general are important to be self-reflective learners. Using reflective-case based learning, students learn better in differentiating individual personality in terms of unit of analyses, structure of personality, factors influencing personality as well as the relationship of personality with other aspects of human life. In addition, through assignments and activities based on reflective-case based learning, it is hope that students would better understand concepts and principles of personality development and differences of personality assessment which based on various underpinning psychological principles

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MAKING LEARNING VISIBLE USING A SELF-ASSESSING CONVERSATIONAL TOOL

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Highlights: This work presents work related to an innovation called "Talk2me". Talk2me is a backchannel with a blend of traffic-light monitoring assessment. This work further discusses about how it is useful in developing students' metacognition and fosters collaborative classroom. This work also draws upon the use of "Talk2me" in a project and how it has benefitted the teacher and students when it is used as a medium for formative assessment.

Key words: Formative assessment; Web tool; visible learning; Digital traffic lights

Introduction

This work presents projects based on an innovation called "Talk2me". As a background, Talk2me offers an alternative to the traffic-light cards strategy, with an additional feature of including how the students perceived their performance. It is a web-based backchannel where upon inserting their names, students can pick either "red", "yellow" or "green" to represent their perceived-ability in performing the task and articulate their thoughts into words. This feature allows mature learners to communicate the questions they have and get answered by their teacher in real-time. Recognizing the diverse intelligences of learners, Talk2me also include several other features where users can include image and video link, start a chat or exporting chat for future references and revisions. This work also presents findings about the impact of Talk2me from the learners' perspectives, based on a case-study. To conclude, Talk2me augments the traditional classroom by giving each student a voice.

Content

Traffic light is a strategy that allow students to assess their progress towards achieving the learning goals set by the teachers, which is made available to them. In a typical classroom, teachers would usually give out an in-class task and while the students are completing the tasks, teacher would walk around to facilitate the completion of the tasks assigned to the students. Typically, traffic light cards are used by the students to indicate their ability to complete the task. "Green" colour infers that a particular student is swift at completing the task given, "yellow" means the student can do but is not confident with his or her work while "red" means the student needs help. The teacher would follow this pattern of recognition by offering help to those students who indicated "red" and even get those students who indicated "green" to assist students who displayed "yellow" cards. This strategy allows teacher to focus on students who are really weak and allow scaffolding to happen intensively among the weak and moderate students in class.

Talk2me offers an alternative to this strategy, with an additional feature of including how the students perceived about their performance. It is a web-based backchannel that makes it ideal to be used in both hybrid classes and online classes, which is dominant during the closure of schools during this pandemic.

Getting the students to recognise their own ability is a self-regulating endeavour, which is important for their metacognition (Hattie, 2009). The exercise of getting the students to know where they are at in their learning, and the destination they need to arrive at is one of the most vital ingredients to produce students who are metacognitively sound (Hattie & Yates, 2014). Besides that, the usage of the tool also encourage collaboration among the advanced- students and those who are still struggling in achieving the success criteria of any topic. The dynamic of classroom integrating collaboration is really an element which cannot be overemphasized in producing learners of the 21st century.

Figure 1: Screen-grabbed from *http://talk2me.uitm.edu.my/*

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IMPLEMENTING AN APPLICATION OF RADIO FREQUENCY IDENTIFICATION (RFID) SYSTEM FOR SMALL BUSINESS PERFORMANCE.

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Highlights: The project investigates the potential of the Radio Frequency Identification (RFID) technology as enablers of intelligent business-to-consumer for tracking the expiry date and missing product in the small and medium retail business.

Keywords: radio frequency identification technology (RFID), small and medium retail business.

Introduction

Today, the evolution of technology happens quickly, improving retail with each revolution. One example is RFID, or radio frequency identification. RFID devices use radio waves to identify and track objects. Many businesses utilize wireless technology in personal digital assistants or hand-held devices, which provide employees with real-time access to product and customer information. Some companies offer smart carts that interact with customers while shopping, suggesting products and notifying them of sales. Moreover, the adoption of radio frequency identification (RFID) will create a revolutionary change in managing a supply chain, particularly in the small business sector. This project aims to study the benefits/applications of RFID on small and medium retail business and in turn, to formulate the cost-benefit analysis model, which helps in adopting this technology. The small business enterprise industry represents one of the largest industries worldwide. For example, in Malaysia, 98.5% of business establishments in Malaysia are SMEs, cut across all sizes & sectors. There are 907,065 establishments of SMEs in Malaysia. SME contributes 36.6% of Malaysia's GDP in 2016. In addition, this industry is facing similar trends to those affecting other sectors, for instance, the globalization of markets, aggressive competition, increasing cost pressures, and the rise of customized demand with high product variants. Nonetheless, the industry also faces specific challenges such as managing the short shelf-life of grocery goods, strict traceability requirements, and the need for temperature control in the retail supply chain (Karkkainen, 2003). The previous findings show that RFID could be implemented in the commercial sectors, specifically in logistics and inventory management. Improved operational efficiency and effectiveness, and increased sales and profits, are the significant perceived benefits. At the same time, implementation cost, compatibility with current systems, top management attitude, and staff acceptance are the key challenges (Maria et al., 2017). The results give business owners a better understanding of the potential benefits and challenges of adopting RFID. Therefore, the businesses able to make more informed decisions in operational planning and resource allocation. Moreover, the results may inspire more SMEs to use this technology. By combining the perspectives of target audience, the RFID-based market value-added model, and qualitative approaches proposed by various scholars, this article contributes to the interpretation of technology transfer in a conventional technologically sophisticated retailing industry. It is believed that someday, RFID tags could be embedded in customer loyalty cards. This would allow

the business owner to track the customers' movement, helping them to make personalized sales pitches. In practice, its massive and global implementation is still being delayed due to the high quantity of factors that degrade the RFID systems performance in these scenarios, causing uncontrolled items and identification losses, and in the end, economic losses. Some works in the scientific literature studied a single or a set of problems related to RFID performance, mostly focused on a specific communication layer: antennas and hardware design, interferences at the physical layer, MAC protocols, security issues, or middleware challenges.

On the other hand, no works are studying the RFID performance in a specific scenario, specifically in assisting small business performance in tracking the expiry date dan missing product. Therefore, the first challenge of this project is to provide a complete analysis of those physical and environmental factors, hardware and software limitations, and standard and regulation restrictions that directly impact the RFID system performance in small businesses. Therefore, communication layers, paying attention to providers, small business companies, and final customers, will address this project. Finally, this project will provide a Guide of Good Practices (GGP) and improve our understanding of the real potential of RFID for small business enterprise, which useful for researchers, developers, and installers.

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GARDEASE: IOT & APPS LEARNING KIT FOR SMART GARDENING MONITORING SYSTEM

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Highlights: With an aim to teach the basic gardening skills and the use of the Internet of Things, we proposed the GardEase: IoT & Apps Learning Kit for Smart Gardening Monitoring System. GardEase is centralized and controlled with a mobile application that aims to educate the user on how to starts to build and maintain a mini garden. Integration of IoT is included with a smart gardening monitoring system to monitor the nutrition value of the plants. GardEase also proposed in conjunction with United Nations Sustainable Development Goals (UNSDG) number 2, 'Zero Hunger' which aim to end hunger, achieve food security and improve nutrition and promote sustainable agriculture by promoting urban farming.

Keywords: Education, Mobile Application, Internet of Things, Gardening, Monitoring System.

Introduction

With more than 3.6 billion smartphones in the world in the year 2020 alone, the power of mobile application should not be underestimated. A mobile application can easily be downloaded by the user through the Apple Store or Google Play Store and with such amount of user, the mobile application can easily encourage and influence people into certain things. To further support the UNSDG, our aim is to further promote urban farming which in recent year had to experience a dramatic increase in popularity (Aurora University, 2019).

GardEase is specialized in indoor farming which is a type of urban farming in high-rise urban area. The included smart gardening monitoring system ease user by helping them by providing alerts and basic of gardening through the GardEase mobile application. Through the mobile application, user can learn how to set up the garden and helps them to start gardening from the basic, Abd Rahim et al (2020). Hence, by integrating IoT with the mobile application, we expect our product to ease people in gardening by teaching them the basic and provide monitoring and gardening solutions.

Content

For this research works, GardEase is split into two main modules. The first module which is the brain of the system is a mobile application called GardEase, an acronym for Garden with Ease. The mobile application provides learning on basic gardening that provided throughout the mobile application. One of the major concerns in gardening, listed by Fiadhi et al (2020) is about water. With relevance to this issue, GardEase includes suitable sensors, which user can interact by using their smartphone to water the smart garden. User can interact with their smart gardening monitoring system that will show the humidity of the soil, surrounding temperature and water level of the water tank on the mobile application. From the mobile application, user can interact with their smart garden by watering them through the mobile application. There are also diary features that help the user keep track of the growth of their plant daily basis. The second module, known

as a monitoring module consisting of three different types of sensors. This includes; (i)a temperature sensor, mainly to monitor surrounding temperature, (ii) humidity sensor and (iii) a water level float sensor.

According to Aurora University (2019), urban farming is experiencing a dramatic increase in popularity, and that is likely because there are so many ways to integrate it into the environment. Some of the major urban farming include "Community Garden" which available to the public and these gardens promote healthy eating and may reduce obesity for participants, Backyard Garden which according to their website 35% of U.S. households grow food at home or in a community garden, School Garden which the USDA reports around 7,101 school gardens in the country, Zfarming (Zero-Acreage Farming) which can be characterized by the lack of land or acreage used for farming activities, Indoor Farming and Vertical Farming. While in Malaysia, the Ministry of Agriculture and Agro-based Industry has sponsored the Agro Journal program that shows urban agricultural technology on television. This is a good approach to raise awareness and knowledge among Malaysian to practice urban farming in urban areas (Zainal, 2018).

Critical Thinking – Help user to stay motivated by helping them at an early stage of gardening.

Learning by doing - Helps the user in engaging with the IoT material and understanding small scales gardening.

Please write any advantages of your innovation/product development/design/process towards education and community.

Raise Awareness – Aware user on the importance of the plant to human daily life.

Cost Saving – Help user save household food by planting themselves.

Avoid Wastage – Prevent beginners' gardener from a stop at an early stage due to failure by providing them basic and awareness.

Please add any commercial value in terms of marketability or profitability of your innovation/product development/design/process if any.

Low Cost – Mobile Application can be downloaded on any Android Smartphone that supports Android 8 and above for free while the smart gardening monitoring system is made from an affordable product.

IR 4.0 – Integrating mobile application with IoT to monitor the smart garden.

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FLOOD DECK: FLOOD DETECTION AND PREVENTION SIMULATION LEARNING SYSTEM

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Highlights: Flood Deck - Flood Detection and Prevention (FDAP) Simulation Learning System is a flood simulation model that consists of multiple sensors, to detect flood simulated phenomena. Flood Deck used three types of sensors; (i) an ultrasonic sensor used to measure the river's water level; (ii) a DHT11 sensor to measure the surrounding area's temperature and humidity and; (iii) a water flow sensor to measure the flow rate of water from the river. This simulated flood model helps to simplify students understanding in detecting the floods and take prevention.

Keywords: *Educational Simulation, Flood Detection, Flood Prevention, Internet of Things, Web-Based System.*

Introduction

Flood is considered the most damaging natural disaster in the world. In fact, an understanding of such an event is also included in our school syllabus. For example, Chapter 2 (Weather and Climate Phenomenon) in form 5 Geography subject discussed weather phenomena that may cause the flooding's. However, it is almost impossible to help students to understand and visualize the floods disaster phenomenon in the classroom. Therefore, in this research work, we proposed a Flood Deck, a learning simulation system that helps to simplify the understanding of how the floods disaster phenomenon happened. We incorporate the Internet of Things (IoT) technology and a web-based system that helps to simulate the floods disaster phenomenon by predicting the event with a floods detection model. The proposed learning simulation provides a fast and reliable tool in simulating the flood disaster phenomenon in the classroom. It also engages the students with real-world scenarios and helps create preventive actions at the community level.

Content

In this research, we developed a flood detection simulation model to help instructors educate students about flooding using a technological tool consisting of sensors, a microcontroller, and a web-based system. The simulation objectives are to i) Develop a technological learning aid; ii) Optimize suitable learning process in a classroom environment; iii) Help student understand and learn faster using a real-life simulation model. Instructors are recommended to use a Competency-based Learning (CBL) method with students during the learning process while using the FDAP Simulation Learning System.

The research focuses on tackling a flood disaster and educating the younger generation about the problem. Flood disaster still happens even though our technological advancement has come so far as 20 years ago. Therefore, prior knowledge needs to be educated to ensure future flood disaster could be avoided with minimal damages. Thus, the simulation system is created to help educate about flood detection based on flood phenomena.

Why are they important to education?

<u>Benefit to education</u>

Practical Learning – Make the learning experience more involved between the instructors and students.

Model Building – Simulation gives students concrete formats on how the science behind flooding works.

Relationships Among Variables – Students could control the parameter for the humidity, temperature, water level, and water flow rate of the simulation environment to better understand how those factors could lead to flooding.

<u>Benefit to community</u>

Awareness & Preventive Measurement – Make learner more aware of factors that could lead to flooding and decide what to do next.

Future Research – FDAP could be used for classroom learning and data gathering methods for flood prediction for future implementation in the real-world environment.

Knowledge Platform – Teaching the younger generation about flood detection to ensure flood occurrence could be minimized in the future.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process, if any.

For Who? - The FDAP Simulation Learning System is not limited to secondary education only but open to being bought for higher education as part of a technological learning aid. For example, university, polytechnics, community colleges and vocational college that focus on meteorological or geographical subjects such as flooding.

How Much? The simulation model is low in price because the sensors used are abundant and could be bought off the shelves. The subscription price for the web domain is dependent on the provider.

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ez-SEMAI

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Highlights: The Semai language learning application (ez-Semai) is the first mobile digital application pioneered to learn the mother tongue of one of the Orang Asli communities in the Peninsula, namely Bahasa Semai. The ez-Semai application provides several easy-to-understand learning modules using interactive multimedia elements as well as quizzes to help the learning process become more interesting and fun. The minimalist ez-Semai application interface design is also more user-friendly and facilitates user interaction. Thus, the production of ez-Semai application can catalyze the process of mastering the Semai Language, by being an alternative material for teaching and learning of teachers and school students or for the use of the general public.

Key words: mobile apps, orang asli, bahasa semai, learning application, teaching and learning

Introduction

Orang Asli or known as indigenous peoples, are the oldest population living in Peninsular Malaysia. This Orang Asli community not only has a unique language but also the knowledge and belief system can be said to be different from other communities. Semai is one of the Orang Asli that is only found in two states in peninsular Malaysia, namely in Perak and Pahang and they use Semai as their spoken language. The new Bahasa Semai was introduced in the education system through the subject of Bahasa Semai and was only available in a few selected schools. Therefore, the mastery of Bahasa Semai in schools and in the general public is very low. Unlike foreign languages which show such widespread use and influence various fields. In addition, the lack of individuals who are fluent in Semai other than the race itself, results in complete reliance on teachers who teach the language. In addition, learning materials such as Bahasa Semai reference books are also limited and difficult to obtain by students and the outside community.

The development of mobile devices is becoming more widespread and is now widely used as an aid in teaching and learning through learning applications because it is easier to access and make the learning process more interactive for students. There are many learning applications have been developed for learning languages mainly English and Bahasa Melayu. In general, the purpose of developing this language learning application is to further facilitate the learning process among students as well as to give students the opportunity to explore the learning process in different environments. Therefore, through the production of this ez-Semai application can help in the learning process as well as be one of the interesting, fun and effective learning reference materials to learn Semai Language.

Content

Ez-Semai is an innovation of Languages Learning mobile application that is really interactive and user-friendly. This digital application are made for the purpose of teach Bahasa Semai which has now been made one of the subjects in Orang Asli schools. The ez-Semai application focuses on the basics of speaking Bahasa Semai which is the National Language of the Orang Asli community in Peninsular Malaysia. The development of this application is one of the starting points for learning Semai Language and can be used for learning the Orang Asli Language of other races as well.

The ez-Semai application was developed using a mobile application platform for learning the Semai Language as it is easy to use and can be operate anywhere and anytime. Along with the passage of time and technology, the development of mobile devices has now also become more widespread and affordable for most people. In addition, there are also teachers and students who have been given mobile devices for free for learning purposes. Therefore, this ez-Semai application can utilize the technology as a medium for teaching and learning Semai Language.

The ez-Semai application provides several easy-to-understand learning modules along with quizzes that can help the learning process run effectively and efficiently. Each learning module provided contains appropriate and interesting illustrations as examples for each word. It is also reinforced by the use of audio to hear the pronunciation of words correctly. In addition, the use of a minimalist application interface also facilitates user interaction when using this application (see Figure 1). Through the use of the ez-Semai application, students or users can learn and master the Semai Language easily and systematically.

The production of ez-Semai application is very significant because it provides an opportunity especially for Orang Asli students to move one step forward by using technology in learning and give awareness to the outside community that there are still languages that can be explored and learned to facilitate the process of communication. In addition, the production of this application can also provide exposure to the outside community about the culture of the Orang Asli community in Malaysia, thus the language heritage can be maintained and preserved so that it does not become extinct over time.
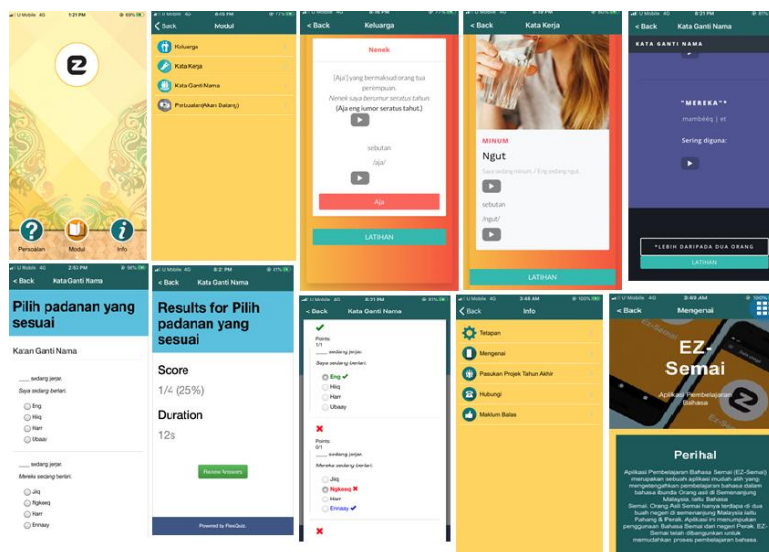
Figure 1: ez-Semai interface

Commercialization potential of the product

Not only a reference source for Orang Asli students and teachers, the ez-Semai application also suitable for outside community who are interested in learning the Semai language. The ez-Semai application can also be used as one of the products to attract tourists to learn about the cultural heritage of the Orang Asli community. The learning modules available in the ez-Semai application can also be expanded in more detail according to skills such as listening and speaking skills, reading and writing. In addition, the ez-Semai application can also be used as an example for the development of Orang Asli Language Learning Applications for other races in Malaysia.

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ARUNGAN ILMU: LEARNING DEVOPS METHODOLOGY USING BLOG WITH MICRO-CREDENTIALS IN MALAY LANGUAGE

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Highlights: The use of DevOps as a project development methodology is on the rise among system developers in today's industry. The DevOps structure provides a very friendly in the Continuous Delivery and Continuous Deployment models. However, this methodology is less well received by students and fresh graduates for lack of sources of local Malay language and had no further information regarding the analysis of patterns of programming technologies that have been used by the industry. *Arungan Ilmu* is an educational application that applies the concept of short-term courses 'micro credentials' in a special presentation in the form of a blog. This application helps students in understanding more deeply related to the latest technology specifically in the field of web system development (web framework). IT has been designed to be suitable for self-hosted learning.

Key words: DevOps, Web, Micro Credentials, Blog, Android, Industry's Methodology

Introduction

According to Masoud Azizinezhad and Masoud Hashemi (2011), blogs are one of the most important technologies on the Internet and have been known by all virtual users. Blogs are a medium that is easily accessible by users by only being accessed using browsers in various types of devices, despite different operating systems (OS). The acquisition of information through the medium of blogs has led to the biggest revolution in the achievement of information technology to become the driver to the emergence of modern systems and applications used today. However, the potential of blogs as a medium of formal knowledge delivery is still less applied by the Malaysian community compared to neighboring countries that use blogs as dissemination of knowledge such as technology, beauty, society and culture and general.

Description of Innovation

The presentation of information in a blog was originally only focused on writing articles in general without having an analysis to track the progress of the blog visitors. According to Jones and Alony (2008), irrelevant data is not a foreign problem for a blog, but it can contribute to problems related to subject observation and document analysis. The lack of accurate data on the effectiveness of blogs in self-hosted learning compared to e-learning systems, MOOC, Micro Credentials or OWC.
Therefore, the idea of developing a content management system (CMS) that is applied with educational pedagogy to form a new system with the concept of content management system (LCMS). According to Irlbeck and Mowat (2007), LCMS is an online content storage medium in which the data are stored, managed and reused through an integrated database system (DBMS). By following the existing system (blueprint) and has been in a stable phase can speed up the

development process of an application and bigger community support. This drives the process of modifying the LCMS according to its own mold by maintaining, reducing or adding new functions to a system.

The main content found in this blog is the topic of DevOps which is divided into several categories and there are also sub-categories. DevOps has covered all the elements in project development such as analysis, design, development, server activation, user support, documentation and related (Bobrov E. et al., 2020). There are also web developments related topics ranging from Front-end and Back-end programming such as HTML, CSS, JavaScript, PHP programming as well as web frameworks such as Laravel and CodeIgniter.

There are two methods of presenting information used, namely general articles and specific articles (crash course). General articles refer to normal articles that are shown to the general reader while short-form specific articles (crash course) focus on e-learning and Micro Credentials. Please include as many of the following sections as possible in your paper, as relevant.

Background of the Innovation

This application has a deeper philosophical meaning from a set of old Malay word Arungan means in the middle of a deep ocean while Ilmu means knowledge in terms of external and internal. Therefore, the two words Arungan Ilmu mean human beings who want to seek knowledge like a sailor who is struggling to sail in the middle of the turbulent ocean of knowledge in order to obtain the light of knowledge (Kamus Dewan Bahasa, 2006).

The application is a hybrid programming concept developed by DevOps methodology that focuses on single module development. Meanwhile, the technology and programming language applied are PHP Framework and Flutter. The server programming used is a VPS with Ubuntu 18 LTS operating system and equipped with Cyberpanel and Docker.

The goal and purpose of this project are to create an alternative hub and become a benchmark in the Malay- language reference sources. This is because the source of reference and tutorial Malay language is very limited in the Malay language that students are mostly looking to neighboring countries such as Indonesia, to learn more about the concept of a program for Indonesian similar to our language. With this application, students can understand more about the technology program in the mother tongue and indirectly uphold the Malay language in the arena of modern technology.

Importance to Education

This innovation can provide a positive impact on higher education because it connects academic knowledge with the needs of the industry in a flexible way the development of programming skills. The information transitions presented link students 'knowledge in the basics of algorithms so often with mastery in the latest programming trends.

This is especially important for students of computer science, information technology and software engineering who need a balance between theory and skills to ensure brighter job opportunities (Bobrov E. et al., 2020). When students prepare themselves with the needs and want of the industry then they will be the top choice of employers in the selection of employees. In addition, early exposure to DevOps, Development Tool and Stack Technology needs to be implemented so that students can adapt to the current cultural shocks of the workplace and reduce the imbalance gap between education and industry.

Advantages of Innovation

- The app is easy to use due to its simple design, minimal light weight and accessible

through the Android platform.

- Students can access this application even if they do not have high-speed internet because all the content is the blog and specifically in the form of articles.
- Students can use this app for free in advance and can upgrade the package to premium if satisfied.

Commercial Value

This application can be downloaded on Google Play only for now for free and will support In App Payment. Profits from this app are derived from ad mob ads, article slot sales and premium membership fees and community support through buy me a coffee. This application has great potential in getting a return on investment (ROI) that is stable because generally students or fresh graduates will seek to obtain new knowledge and must find the source of the Malay language in advance.

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DEVELOPMENT AND EVALUATION OF A USER-CENTERED OPEN ACCESS ELEARNING RESOURCE: THE LITERATURE SEARCH REUSABLE LEARNING OBJECT (RLO)

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Highlights: The Literature Search (http://acord.my/RLOs/literature-search) reusable learning object (RLO) was co-created for students to learn how to search for literature to answer clinical and healthcare related questions. It is a practical and interactive open access online resource where students are given a clinical scenario at the start to activate their learning; subsequently guided with images, demonstration videos, quizzes and interactive activities to facilitate their learning of literature searching concepts and skills; and finally apply the knowledge obtained to search for the answer to the clinical scenario in a medical literature database.

Keywords: Reusable learning object, literature search, evidence-based medicine, user-centred development, co-creation, learning analytics

Abstract:

Project Description & Objectives

The Advancing Co-creation of Reusable Learning Objects (RLOs) to Digitise Healthcare Curricula (ACoRD) project aims to build the capacity of Malaysian academicians, learning technologists and other stakeholders in co-creating user-centred RLOs for healthcare curricula. An RLO is an open access, interactive, multimedia web-based resource based on a single learning objective which can be used in multiple contexts.(Bath-Hextall, Wharrad, & Leonardi-Bee, 2011) The key characteristic of an RLO is that it has to be short, to accommodate human's working memory timespan of 7±2 minutes.(Miller, 1956) A total of 23 RLOs are being developed by teams from University of Malaya (UM), Universiti Putra Malaysia (UPM) and Taylor's University (TU). Using the 'Literature Search' RLO as an exemplar (http://acord.my/RLOs/literature-search), this abstract aims to describe the content, development, evaluation and implementation of an RLO.

Development Process

In the first phase of this project, a survey was conducted with the students and lecturers from UM to identify suitable topics to be developed into RLOs; 'literature search' emerged as one of the preferred topics. Librarians and evidence-based medicine experts who taught 'literature search' contributed to the development of the content of this RLO, which aimed to teach students how to search for literature to answer clinical questions. Following the ASPIRE RLO development framework, the RLO was developed systematically by: (1) drawing the storyboard; (2) populating the specifications; (3) creating the prototype; (4) reviewing of the prototype by a medical student, an evidence-based medicine expert and an eLearning expert; and finally (5) releasing it for use in teaching and learning.

Content of Innovation

The finalised 'Literature Search' RLO is a short (8 webpages), practical and interactive e-learning object. It begins with a clinical scenario to activate students' learning. Subsequently, students learn about the concepts and skills of literature search via images, demonstration videos, quizzes and interactive activities. The RLO ends by asking students to apply what they have learned by searching for the answer to the clinical scenario using a medical literature database (PubMed). The RLO was crafted based on Merril's Instructional Design Principle.(Merrill, 2002)

Integration into Teaching

This RLO was developed with a librarian who teaches information skill. Not only was it integrated into her own class, the RLO was also shared with other lecturers who taught the same course, who used it in different ways including flipped and blended learning. The link of this RLO is often given to the students during class as a supplementary resource.

Multifaceted Evaluation

The evaluation of the 'Literature Search' RLO comprised: (1) pre- and post-RLO use knowledge and confidence assessment; (2) students' feedback survey; as well as 3) using Google Analytics (GA) to track users' profile and number and to measure user acquisition and behaviour.

The preliminary findings showed that there was a significant increase in the knowledge score (six questions on literature search concepts) [pre-RLO (n=108): mean=5.00 ± 1.2 vs post-RLO (n=59): mean=5.76 ± 0.60, p<0.001)]. The confidence score (Likert scale 1 to 5) also significantly increased from [pre-RLO (n=37): mean=2.68 ± 0.97 vs post-RLO (n=15): mean=3.47 ± 0.99, p=0.018].

For the feedback survey, 100% of the respondents (n=38) would recommend this RLO to others and the mean score for 'RLO being helpful' was 4.79 (Likert scale 1 to 5). What the users liked most about this RLO' reported was that the content was simple and easy to learn.

The GA showed spikes in usage over the 6-month period, which coincided with the teaching classes. Most accessed the RLO via the direct link provided by the lecturer. The GA recorded 655 sessions in total but only 91 (13.9%) of the sessions showed completion of all RLO pages.

Next step

At the time of abstract submission, all RLOs developed by the ACoRD project, including the 'Literature Search' RLO, are still undergoing internal evaluation. Once the evaluation is complete, the RLO will be revised before disseminating to other academic institutions in Malaysia and globally. The team will analyse the GA data after dissemination to further understand the learning pattern and behaviour across different institutions and regions. The team will also explore the reasons for the low completion rate of the RLO, which will help to improve future development of RLOs.

Usefulness for Education and Community

This RLO has simplified learning and provides an alternative (more accessible) way for students to learn about literature search to answer clinical questions. The ethos of an RLO is for it to be reused by anyone, at any time and wherever they are; hence, it has been filed under the Creative Commons license. This RLO is open access and, once ready, will be widely disseminated to benefit students in Malaysia and across the world.

Figure 1. Snapshot of the Literature Search RLO.

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PEMBANGUNAN MODUL INTERAKTIF 'AUGEMENTED REALITY' BOARD GAME KEMBARA P4T

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Highlights: Implementasi elemen gamifikasi dalam sesi pdp (pengajaran dan pembelajaran) menjadikan proses pembelajaran lebih menarik dan interaktif, selain menjadikan aktiviti yang pada asalnya bukan permainan sebagai satu aktiviti bermain yang formal,bermanfaat dan serius. Tujuan utama gamifikasi ini adalah untuk memberi motivasi, merangsang minat, mewujudkan pengalaman menarik kepada pelajar yang bermain, menggalakkan mereka belajar menyelesaikan masalah serta membina kemahiran sosial melalui setiap peringkat atau tahap permainan.Penerapan elemen gamifikasi oleh pensyarah dalam proses pdp dapat membantu pelajar dalam tiga aspek utama iaitu: Pertama Kognitif: Permainan membimbing pemain melalui proses penguasaan dan membuat mereka terus terlibat dalam tugas-tugas sukar. Gamifikasi P4T ini menyediakan beberapa alternatif menuju kejayaan. Hal ini dapat meningkatkan motivasi dan penglibatan dan membentuk perspektif baharu terhadap pembelajaran. Gamifikasi dapat mendorong pelajar untuk "ambil tahu" tentang apa yang harus pelajar lakukan untuk menguasai pembelajaran. Kedua Emosional:Permainan melibatkan pelbagai emosi yang kuat, bermula dari rasa ingin tahu, kegembiraan, sehingga kecewa. Dalam banyak permainan, satu-satunya cara untuk belajar adalah dengan mengalami kegagalan berkali- kali. Dengan gamifikasi, pelajar belajar dengan cara melihat kegagalan sebagai peluang, dan bukannya sebagai alasan untuk putus asa. Ketiga Sosial:Permainan Gamifikasi P4T membolehkan pemain untuk "cuba" identiti dan peranan yang baharu, bermula dari yang sangat fiksyen, sehingga yang bersifat lebih nyata. Dalam pembelajaran yang menggunakan gamifikasi, pelajar berkesempatan memperoleh kredibiliti sosial dengan jaringan sosial untuk prestasi akademik,baik dari pensyarah mahupun sesama pelajar. Selain itu, gamifikasi yang dirancang dengan baik dapat membantu pelajar menghayati dan menghargai peranan untuk pembelajaran dan menyedari potensi mereka.Gamifikasi sememangnya memberikan kesan yang positif dalam proses pdp dan sesuai dilaksanakan seiring dengan minat pelajar dan tuntutan perkembangan pendidikan pada hari ini. Gamifikasi boleh dijadikan satu pendekatan berkesan untuk mencetus perubahan positif dalam tingkah laku dan sikap pelajar terhadap pembelajaran. Apatah lagi elemen gamifikasi sangat

mudah dan fleksibel untuk di integrasikan dalam proses pengajaran sebagai aktiviti untuk mencapai objektif pembelajaran yang tertentu.Gamifikasi kini menjadi topik yang hangat diperkatakan sebagai antara kaedah pdp terbaik dalam konsep Pendidikan IR4.0). Bagi memastikan penggunaan elemen gamifikasi dalam proses pdp berjaya,dilaksanakan dengan sempurna,memberi manfaat kepada pelajar dan mencapai objektif pembelajaran,pensyarah perlu melakukan perancangan awal agar permainan atau aplikasi yang dipilih sesuai dengan kandungan pelajaran yang ingin disampaikan.Selain itu pensyarah juga wajib membuat persediaan dengan memastikan semua peralatan,sumber dan bahan bantuan mengajar (BBM) yang berkaitan dilengkapkan, termasuklah kemahiran pensyarah sendiri untuk mengendalikan aplikasi gamifikasi P4T yang hendak digunakan ini.

Key words: *Board Game 'Kembara P4T' Penjana Inovasi Pdp Musim Pendemik Covid-19*

Introduction

Permainan Kembara P4T merupakan permainan yang pertama berkonsepkan pembelajaran berdasarkan permainan menggunakan elemen Augmented Reality. Permainan ini diasaskan menggunakan konsep asal permainan monopoli iaitu ada element soalan, bonus dan konsep jual beli.
Kembara P4T adalah permainan yang terbaik dalam industri pendidikan yang menpekenalkan konsep pembelajaran berlandaskan permainan (Games Learning) dalam Kursus Tamadun Islam dan Tamadun Asia (TITAS). Permainan ini diterapkan dengan elemen-elemen mengenai konsep dan permahanan dalam pembelajaran tamadun-tamadun di dunia seperti tamadun melayu, tamadun islam, tamadun cina, tamadun india dan isu-isu semasa. Kembara P4T merupakan landasan yang terbaik untuk mensasarkan pelajar ke arah pembelajaran yang seiring dengan dunia globalisasi dan anjakan era revolusi 4.0 (IR 4.0), disamping pembelajaran

berpusatkan pelajar.

Content

Bahan Bantu Pembelajaran selari dengan kemajuan dan pembangunan teknologi dalam menghadapi cabaran Revolusi Industri 4.0. Strategi pembelajaran berpusatkan pelajar bagi Kursus Tamadun Islam dan Tamadun Asia berkonsepkan Augmented Reality (AR). Element asas produk ini iaitu berkonsepkan permainan monopoli yang diterapkan dengan element-element sejarah dan ketamadunan dunia, disertai dengan soalan-soalan yang meliputi pelbagai peringkat pembelajaran untuk mudah dipahami secara berperingkat. Papan permainan Kembara P4T, semua pemain akan bermain di atas papan ini. Kad-kad soalan dan bonus juga akan disusun ditengah-tengah papan di dalam kotak yang disediakan.Pemain disediakan sebanyak 8 buah objek (buah permain) yang mewakili seramai 8 orang pemain yang boleh bermain dalam sesuatu masa.Kad soalan - Pemain dikehendaki imbas soalan dibelakang kad untuk menjawab soalan.Kad Bonus - Pemain dikehendaki imbas soalan bonus dibelakang kad untuk menjawab soalan.Kad Sewa-Beli - Pemain boleh membeli barang-barang alatan dan radas kimia untuk dijadikan aset semasa bermain.Manakala Kad Bank – Kad untuk memudahkan sebarang penambahan atau pengurangan skor, samada semasa membeli aset, menolak markah pihak lawan atau menebus aset di akhir permainan. AR untuk Board Games Kembara P4T amat penting dalam pendidikan

kerana dapat meningkatkan pengalaman pembelajaran pelajar melalui penyertaan, penglibatan setiap pelajar dan pendekatan pembelajaran berasaskan teknologi AR dan tradisional, menyediakan buku panduan PdP, aktiviti dan penilaian melalui penyediaan modul kursus sebagai nilai tambah dan menyediakan 'platform' perbincangan,percambahan idea, minat melalui kad-kad 'games'Kembara P4T ini. Pembangunan dan reka bentuk produk ini bermula dengan memilih Kursus TITAS yang melibatkan 4 Peradaban Dunia (SKP2203), melalui pendekatan modul dan 'games' Flip Classroom, berbantukan AR, PutraBlast dan Web 2.0, dan menghasilkan produk dalam bentuk modul dan KIT 'Board Games' Kembara P4T. Sebelum Kembara P4T, penyelidik akan 'create' kandungan 'content kursus', kandungan untuk AR, 'create AR', dan melakukan integrasi antara kandungan kursus dengan AR. Selanjutnya penyelidik akan bangunkan 'kandungan games', integerasikan antara kandungan games dengan AR, 'create kandungan 'hames' dan bangunkan 'model 'games' tersebut. Akhir sekali penyelidik akan menyediakan rubrik penilaian daripada pelajar yang mengambil kursus ini melalui soalan yang diajukan berdasarkan modul dan 'games' yang dibangunkan, menambahbaik modul kursus dan 'games' untuk akhirnya mendapat perolehan 'HakCipta' (IP) daripada MyIPO. Jangkaan penyelidikan akan menghasilkan 3 hakcipta iaitu dalam bentuk 'Modul Kursus' dan Kit Board Games Kembara P4T, serta Model Kad Permainan. Kebaikan daripada inovasi pasti dapat membina konsep dan idea baharu, boleh dikongsi, boleh dikomersialkan dan boleh dijadikan bahan bantu mengajar afektif dan inovatif kerana kursus ini melibatkan pelajar yang wajib mengambil dan dijamin memudahkan untuk urusan PdP, penilaian KBAT pelajar dan juga bersifat 'Student Centered Learning' dan juga boleh dilaksanakan atas talian /secara maya terutama dalam musim pendemik yang perlukan penjarakan sosial, sentuhan fizikal dan pasti menarik minat dalam setiap PdP. Potensi besar juga dapat meningkatkan proses pembelajaran, tambah nilai, penglibatan aktif,tambah baik 'performance' pelajar dan kekuatan belajar melalui reka cipta produk yang inovatif ini juga memudahkan urusan kurikulum PdP kursus ini. Berkaitan potensi pemasaran atau jualan sudah pasti dapat dilakukan dengan baik sebagai harta hakcipta dengan membangunkan Modul serta Model Kad Permainan yang diintegerasikan pula dengan Augemented Reality serta amat berpotensi untuk jualan kepada seluruh pelajar di IPT Awam dan Swasta yang agak ramai.

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IMPLEMENTATION OF INTEGRATED PROJECT AND ONLINE COLLABORATIVE LEARNING FOR COMPUTING COURSES DURING EMERGENCY REMOTE (ER) TEACHING AND LEARNING

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Highlights: This study shares our experiences in implementing an integrated project of two courses namely System Analysis and Design (SAD) and Database (DB), for Computer Science programmes in School of Computing, Universiti Teknologi Malaysia (UTM). This has been implemented for few years, however due to the COVID-19 pandemic, we need to redesign the integrated project implementation and assessment to ensure online collaborative learning was embedded for in both courses. This is important to achieve the technical and team-work skills in the intended course outcomes of both courses.

Keywords: *Integrated project; Online Collaborative Project; Emergency Remote TnL;*

Introduction

System development has always been an important part of learning for computer science students (Sadasivam & Arumugam, 2018; Titovskaia et.al, 2019). This often addressed in two subjects, one focuses on system analysis and design (System Analysis and Design - SAD) while another focuses in database design and development (Database Development - DB). The skills and knowledge acquired to develop a working system will be beneficial for students before they enter working life. Both courses also enable students to study information system requirements for any system application within an organizational context. The contents are sequentially organized directly from planning, analysis, designing and implementation phases (Ibrahim & Abd. Halim, 2014). From the resulting output of the planning and analysis phase should enable students to form input, output and interface design. Hence a prototype design can be demonstrated.

The current literature on System Analysis and Design (SAD) and Database (DB) courses are very sparse. Research shows that SAD and DB is taught and assessed in varieties of ways. For example, they discussed teaching techniques such as case studies, problem-based learning, flipped classroom, agile approach and simulation. Several studies also focused on the project implemented in SAD courses by using service-learning project (Chen, 2013), real project (Sadasivam & Arumugam, 2018; Wong, 2017; Wong & Lee, 2018) and prototype (Ibrahim & Abd. Halim, 2014; Titovskaia et.al, 2019). However, many from the above studies do not really address the implementation on the combination of similar project use in SAD and DB.

SAD-DB Integrated Project

We observed that in Malaysia, most faculties design these courses to provide practical approaches of analysis and designing skills in developing a working database system. We also observed that Computer Science faculties in Malaysia offer both courses to their undergraduate students, but in different semesters, except for few universities. And it is unknown on the project implementation.

We believed that hands-on experience during the system development phases gives students the essential knowledge on system development. As for UTM, the previous implementation on the project for both courses was done separately. However, we found that in such implementation, students were unable to see the relationship and connection between development of a database system with system analysis and design. Thus, in session 2017/2018, lecturers made the decision and planned to have an integrated project for both courses to strengthen and promote a more comprehensive understanding for both courses.

The implementation of the integrated project was done by reviewing the course learning outcome, and based on our observations, we can see that there are similarities in the CLOs for both courses, where CLO2, CLO3 and CLO4 involves the design of the proposed system. Summary of the assessment for each CLO in both courses is shown in Figure 1:
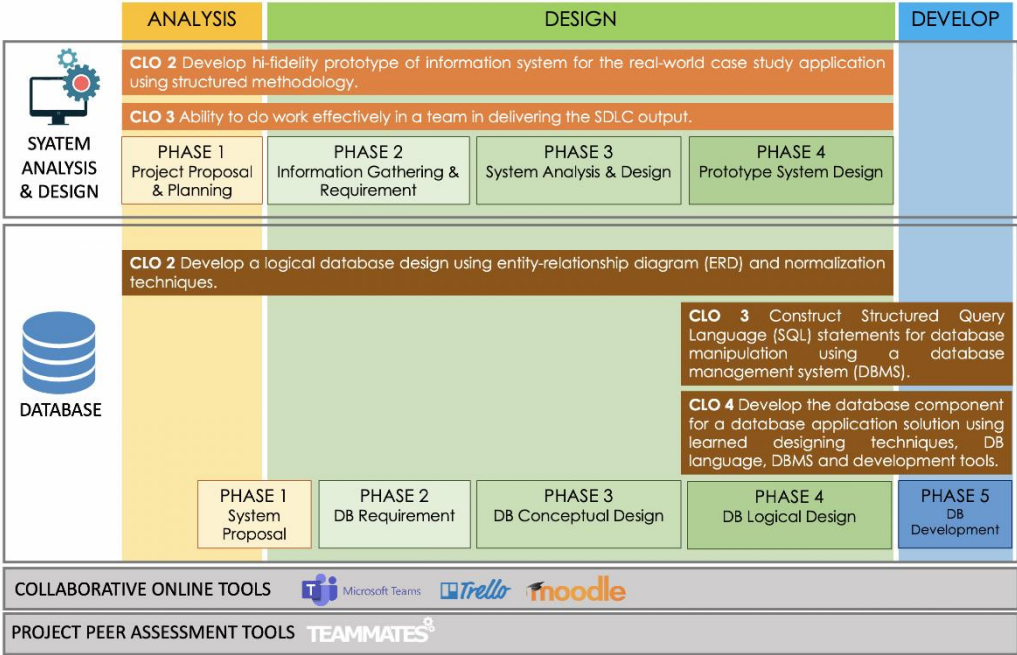
Figure 1: Implementation of Integrated Project for SAD-DB

As seen in Figure 1, both courses focused on the design phase of system development lifecycle (SDLC) and database development lifecycle (DBLC). The integrated project consists of a full report on the proposed system, but with different elements based on each course. Table 1 shows the required elements for both courses.

Table 1: Requirement and Submission for Integrated Project

SAD	DB
PHASE 1	
To conduct background and feasibility study of the problem. To proper plan the project management. To identify major user of the system and system boundary. SUBMISSION: Project proposal	
PHASE 2	
Gathers information about what the users want in the new systems *(to-be)* based on the current system *(as-is).*	Gather general requirements for the database system by describing any features to be included in the new database system
SUBMISSION: Report on System Data Requirement and Transaction Requirement	
PHASE 3	
States what the new system will do (context diagram) Generate logical diagrams for new systems (DFD level 1, 2) Defines processes at all levels (lower levels DFD). Defines all data required (database design/tables) INITIAL SUBMISSION: Conceptual and Logical DFD *(few iteration)*	Create a conceptual ERD to represent and produce the data dictionary for the created conceptual design SUBMISSION: Conceptual DB Design (ERD) & Initial Data Dictionary *(few iteration)*
	PHASE 4
	Transform the conceptual ERD in P3 into logical ERD and validate logical ERD with the system's transaction requirements
FINAL SUBMISSION: Conceptual to Logical DFD & Process Specification. Logical DB Design (ERD, Relational Schemas, updated Data Dictionary)	
PHASE 4	**PHASE 5**
Develop system prototype based on system design	Build a database based on Oracle / MySQL DBMS.
SUBMISSION: System Prototype with SQL queries	

Students need to make sure the project are aligned with the requirement and outcome of both courses. This helps the students to understand in learning the important steps and techniques in planning, design and development of a database system owing to the close relationships of the components between these two courses.

The integrated project is a group/team work and during the pandemic, it was important to make sure the students were able to discuss in groups even they were in different locations. Thus collaborative online tools such as Microsoft Teams and Trello were utilized in all phases of the project. Microsoft Teams were created for each group, where they can have video meeting and share their work. Whereas Trello was mainly used for project planning of each phases. E-Learning platform (via Moodle) was also used as a communication platform for students to download and submit their work. With guided instruction and frequent monitoring by the lecturers via the

collaborative online tools, students were able to communicate with their members in successfully implementing the project.

For the assessment, we utilized Teammates (https://teammatesv4.appspot.com/) for peer assessment, where for each phase, students were required to give marks and comments on their groupmate works. We also encourage the groups to have rotation of project leader in order to give experience to each students to lead and manage their project.

Conclusion

One main challenges we had with the integrated project was to make sure the students were in the same section for both courses. This is important as we need to make sure the students will be able to do the integrated project with the same case study. Thus, early intervention on the project group member was crucial at that time.

Another challenges was to make sure the students were able to communicate well with each other during the project phases during the remote emergency T&L. The courses were offered to second year students (in their third semester), thus most of them were still not familiar with each other. Most of the international students were also back in their home country, so time difference also needs to be consider when doing online meeting between them. But the use of Trello and Microsoft Teams have helped them to organized their work, and proper monitoring by the lecturers.

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Appendices

A1: Project Management in Trello

A2: Collaborative Online Discussion in Microsoft Teams
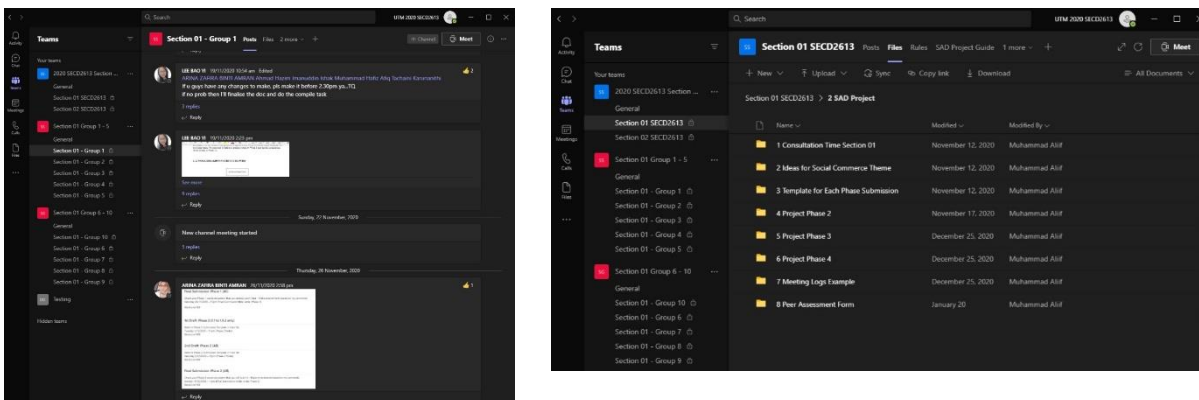
A3: Teammates for Peer Evaluation

CLOUD-BASED AUTHENTIC ASSESSMENT TOOL FOR STUDENTS' INVOLVEMENT IN COMMUNITY SERVICES

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Highlights: We developed a solid authentic assessment in term of affective domain for students' involvement in the community project. It is developed using Cloud services that aims to be easily accessed through online by the main entities i.e., lecturers and students. The organization in assessment itemization provides clear appraisal process and improves marking integrity while supporting the online teaching and learning approach.

Key words: Authentic assessment, Cloud service, Community services project, Affective domain, Teaching and Learning.

Introduction

Involvement in community services becomes an integral part of student education, especially in higher-learning institutions. Such involvement that combined with formal learning adds value to the students in terms of developing their attitudes and commitment. This work attempts to assess student's capability in handling the real issues/problems through a practical experiment where we used the community services as a case study. Note that, it incurs additional efforts to measure such practical activities with evidence to be collected and assessed for verifying either it reflects the students' knowledge/skills or not. In this work, we developed Cloud-based authentic assessment tool for measuring students' involvement in community services through affective domain. The online tool intends for allowing the assessment process being performed in real time manners.

Assessment Design

There are five assessment criteria in our tool in respond to the five affective domain that need to be fulfilled by the students. At each level there are thorough elucidated evaluation criteria to be assessed where the students required to provide project's evidence. The assessment starts when the students formed the team member and assigned the roles. Further, they will be decided on which community is chosen for the project. It is necessary to choose the recent issues of the community and design appropriate activity for the community. Later, they need to run the designed activities with the chosen community. It can be implemented in several ways for example by knowledge sharing, motivating, and assisting where it also allows to execute through hybrid online. The evidence for each progress can be submitted in any form e.g., document, picture, video etc.

Once the group submitted their complete evidence, the lecturers received the submission notification through email. The evaluating process is then performed by the lecturers. In the evaluating part, the lecturer merely downloaded the submitted evidence. If the evidence is appropriate and match with the respective affective domains, then the mark is given by only

clicking the YES button where the mark automatically record. In this assessment mechanism we do not use any rubric due to the affective domains already highlighted the assessment criteria. In addition, our Cloud-based assessment tool presented the results in a web chart report (Figure 1) to summary marks of each affective criteria. By incorporating it this way, the student can improve their affective criteria in next class or other activities.
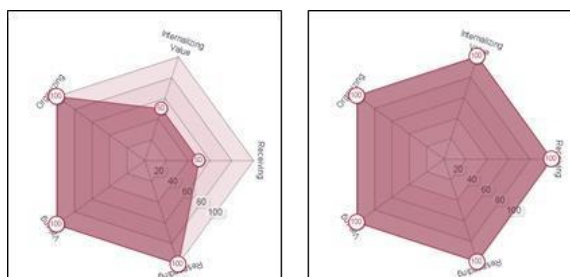
Figure 1

Benefits

We make the assessment process lighten up because focused more on the student's skill development rather than messiness marking steps. The assessment module is developed and presented using Cloud service and required for the lecturers and students to register and login for allowing them to access from anywhere at any time. The way of reporting style is according to five levels in affective domains; hence it makes the evaluating process much easier where the submitted evidence/report are already split up into certain parts for evaluating purposes. It further gives advantage to the students as they can focus suitable evidence/documents to be uploaded on parts that matter. It reduces conflicts of subject matters and redundancy in data and information. Due to the assessment made through Cloud service the evaluation materials can be assembled, previewed, edited, and published instantly. It saves the overall assessment process and time.

Analysis and Conclusion

To analyse the effectiveness of the authentic assessment mechanism, we analysed the students' satisfaction towards the Cloud-based assessment medium. The finding reveals (Table 1) very remarkable responses that means the assessment mechanism is applicable and helps the students to focus on type of evidence to submit and plan for appreciating the executable community project. It makes our Cloud-based assessment approach practicable can be employed in any courses and class activities. Due to it is the first version of the Cloud-based assessment system, the design of dashboard is still open for a lot of improvement. Optimistically, our assessment mechanism becomes an alternative approach in making authentic learning more inspiring while casting versatile graduates. Furthermore, our assessment mechanism can assist in online teaching and learning approach that been extensively used during COVID19 pandemic.

Table 1. Satisfactoriness Analysis

Dimension	Percentage
Satisfy	
Easy to use	93.3
User friendly GUI	63.3
Interactivity	
Criteria definition	73.3
Criteria organization	93.3
Reliable submission	100
Applicable	
Suitability	93.3
Accessibility	100
Integrity	95.7

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PROJECT-BASED LEARNING APPROACH IN BIOINDUSTRIAL TECHNOLOGY COURSES THROUGH INNOVATIVE PROJECT DESIGN

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Highlights: Downstream Process and Scale up Process are core technology courses that comprises theory and practices regarding principle and application in bioindustry. Traditionally, the lectures have being delivered through conventional face-to-face (F2F) for lectures and laboratory sessions for the implementation of theory and practices of technological courses. Project-Based learning (PBL) is an instructional methodology through engaging experience by applying knowledge and skills to encourage student's engagement for collaborative learning and problem solving skills. In this invention, the concept of 'Innovative Design Project' was implemented through Project-Based Learning approach. This project was designed to suit the course objectives by introducing the application of real case studies in bioindustry. From CLO analysis (student achievement index) and course grade analysis (grade scored), it was found that student performances are improved as compared to previous batch.

Key words: Downstream process; Scale up Process; Innovative Design Project; PBL

Introduction

In this innovation, Project Based Learning (PBL) approach was applied in Downstream Process and Scale up Process Course to enhance the understanding regarding the principles and application of both courses in bioindustry. Both courses are technical core subjects for Bachelor of Applied Science (Bioindustrial Technology) that being offered in fourth and fifth semester. Downstream Process course discusses the procedures involved in obtaining materials (sources of plants, animals and microorganisms) at a level acceptable to the consumer. In Scale up Process course, the potential methods that have been used to transform laboratory information into industrial scale that involve physical and biological methods being discussed.

There are different ways to establish a creative environment that allows integration between theoretical concepts and practical aspects, together with development of students' teamwork skills. Project based learning (PBL) approach being implemented for this innovative design project. PBL method uses the concept of student-centered learning whereas students being active learners that involve planning, executing and documenting while working in groups (Aksela & Hattainen, 2019). Better implementation of PBL in practice through collaborative learning in which students and lecturers are learning from each other could enhance the interaction between students and lecturers and also promote teaching pedagogy method (Han et al., 2015). PBL is characterized by students' autonomy that refers to student centered learning, constructive investigations for the problem solving, goal-setting, collaborative learning, communication and reflection within real-world practices (Kokotsaki et al., 2016). Collaborative learning improves

the student's ideas and thought regarding the execution of the project and student's abilities for teamwork as projects are often done in groups (Kavlu, 2015).

In this context, this innovative design project being developed by introducing the application of real case studies in bioindustry. This project being designed using integrated assessment to implement PBL that can lead to the development of industry relevant skills and prepare student for lifelong learning. In this innovation, it was observed that the decision to integrate real case studies from industry into both courses led to significant motivation for students to progress their projects. Consequently, the learning process for unit operations in bioproduct production was shown to be effective. In addition, students have improved their knowledge of process flow diagram for manufacturing process. Finally, other skills and competencies were stimulated during the PBL process, such as teamwork and the capacity to transfer what has been learned to other related disciplines.

Content

Before the innovations was introduced, the mini project regarding project design was conducted by conventional method using face-to-face (F2F). The data for the project mostly being provided by the industries for problem solving case studies and additional data obtained from previous journal articles. However, during Covid-19 pandemic, transitioning to the new normal of teaching and learning, alternative method needs to be implemented during online learning to enhance student engagement through project-based learning approach.

Through this innovation, Trello app, a visual tool for project management being used. Before the innovation being developed, a survey for the level of internet access among students was conducted to ensure that all the students' involvement for the design project by considering their internet access at home. It was found that most of the students which refers to 29 out of 44 students (65.9%) have medium internet access while 6 of them (13.6%) have weak internet access. Only 9 out of 44 students (20.5%) have high internet access. Trello app previously being used as project management tool but in this design project, this app was implemented as project monitoring for the students and acts as platform or medium to create collaborative learning environment. In addition, this app is also simple and flexible for the students as the briefing on how to use the app as educational tool being given to the students. Bioprocess simulator, SuperPro Designer software also being used to facilitate modeling, evaluation and optimization of integrated batch and continuous processes in a bioprocessing industry.

In the case of PBL approach, tasks that need to be accomplished in the project were planned accordingly to the time given until project completion. By integrating Trello app as the platform for this PBL method, a comprehensive tasks or activities that need to undergo by the students being listed and monitored every week by the lecturers. Figure 1 shows the tasks in project design work that comprises the development of process flow diagram (PFD) for the selected bioproduct, process/unit operations involved in the upstream and downstream process and operating conditions. At the end of the project, students need to prepare a short video of their project as final presentation. Total assessment for this project is around 30% out of total mark. This project design was evaluated by two aspects which are progress work of the project (20%) and video presentation (10%) as shown in the figure.
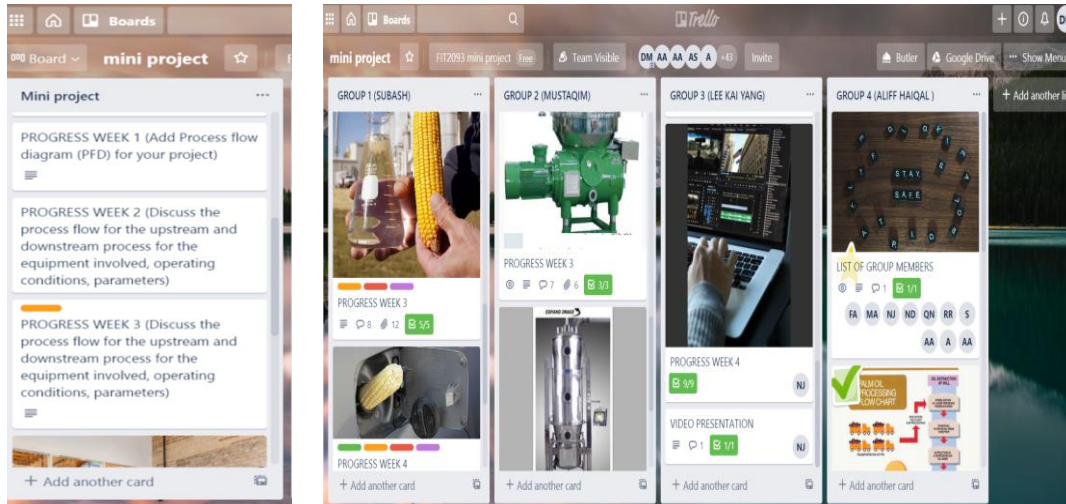
Figure 1: Tasks and progress work of project design in Trello board

Each card was allocated for each group to report their progress every week. In addition, in each card, the students or each member can participate actively for the project by discussing the progress in Trello board. The lecturer also can reply to the comments as this app also being used for the discussion platform. This platform create interaction between students and lecturers if they have any problems regarding the given tasks. Lecturer also can monitor their progress from time to time until project completion. This project was conducted to fulfill Couse Learning Outcome 3 (CLO3). Learning outcome cluster for this CLO is cluster 3D that refers to digital skills whereas the ability to use information/digital technologies to support work and studies. The skills include sourcing and storing information, processing data, using applications for problem solving and communication as well as ethics in applying digital skills. Digital skills were applied for this project design by integrating Trello app and SuperPro Designer Software. According to CLO analysis (student's achievement), it was found that the performance of the students was improved for CLO2 and CLO3 that emphasize on technical skills as compared from the previous batch is shown in Table 1.

Table 1: CLO analysis for second year students as compared to previous batch

PROGRAM	CLO2		CLO3	
Academic Session 2018/2019 *Before Invention	Downstream	Scale up	Downstream	Scale up
	2.99 (Good)	3.11 (very Good)	3.08 (Very Good)	3.16 (Very Good)
Academic session 2019/2020 *After Invention	Downstream	Scale up	Downstream	Scale up
	3.05 (Very Good)	3.53 (Very Good)	3.25 (Very Good)	3.30 (Very Good)

This innovation comprises type of job skills needed in 2025 according to the World Economic Forum's Future of Jobs Report that includes problem solving, self-management, working with people and technology use and development in order to prepare students for their careers in future (Whiting, 2020).

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COURSE INFORMATION DEVELOPMENT SYSTEM

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Highlights: Designing "A One-stop Platform to Stand On" web-based implementation portal to facilitate the systematized creation, management and archiving of course information in well-structured and effective manner

Key words: Course Information, Develop, Computing and Technology Automation Services, Course Coordinator, Program Coordinator, Upper Management Committee

Introduction

The course information of record plays a central role of serving as the primary course-level academic standards in the curriculum of University Technology of Malaysia. As such, the prerequisites that the students need to advance successfully through a series of the courses are based on information provided in the outline of record. It became an increasing concern across the decade that curriculum committee members lacked uniformity in sequencing the manual preparation of course information process. The purpose of this study is to develop a one-stop department wide web-based implementation software named Course Information Development System (CIDS) which can be used by all the lecturers in facilitating the systematized creation, management and archiving of course information. A system development methodology selection based on iterative approach has been proposed in this study. The overall project lifecycle is composed of three iterations whereby each iteration was repeated with requirement analysis and design, implementation, and testing phase till an integrated system is released. The domain system requirements were documented in Software Requirement Specification (SRS) before getting into design phase. Subsequently, the transition from the analysis model to the design model was performed at four levels of design detail: data structure, system architecture, interface representation and test case execution. All the related system design models were adopted and fit into Software Design Document (SDD) and Software Testing Description (STD) respectively. Ultimately, each of the elements involved in the analysis and design model have resulted in validating good quality of course information management system, which are associated by being the solutions to tackle the problems of unstructured ways in organizing the course information content provided.

Content

Course Information (CI) is generally defined as a learning-centred documents which serves as a bridge between students and university lecturers detailing the expectation that tends to be achieved in particular courses. The critical resources including in the course information are the course description, course goals, student learning outcomes, assessment overview and schedule of learning activities. Basically,course information plays significant role in two fundamental areas-permanent record for evaluations of courses as well as becoming an effective learning tool for students by conveying the content of the course clearly. "The course information is often the initial communication tool that students receive and is often the most formal mechanism for sharing the information with students regarding the course" (Eberly,Newton, Wiggins, 2001, p.56).

Undoubtedly, the process of preparing a course information must well-matched and equipped with the correct format or structure of the syllabus. Although it tends to appear as a piece of written documents of the course description, it is an undeniable fact to prove that the success of a course is on the hands of how systematic the objectives and outlines being designed. Despite the importance of a course information, Eberly et al. (2001) further described that the structures and formats of written Course Information (CI) have kinds of trends that are handed down from one generation to the other till some of the features are overlooked. With the emerging of new courses evolved over time, course information construction could be quite tiresome.

The present proposed system provides an insight of developing a uniform departmentwide conceptual framework application for all course information in the campus by looking to the future in terms of integration of computing and technology, so that professors across the universities have a clear direction in creating course information under inclusive learning environment.

The proposed system has its significant relevance in solving the problems of unstructured ways in organizing the course information content provided. Having a one-stop centralized model-oriented platform in managing all learning-centred document. Course Information (CI) enable the users the access control to the most up-to-date information. An arithmetic algorithm is performed in compliance with this automation application by which tends to reduce the time for lecturers in calculating SLT of learning outcomes. Generally, the architecture of the software application eases the target users to create, edit and modify CI in an effective manner.

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EXCELLENT EXTERNAL INSTRUCTORS MANAGEMENT THROUGH E-FASI INTEGRATED SYSTEM

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Highlights: Coming from different academic and social backgrounds with wide range of knowledge in their specialized area, external instructors are vital to ensure the smooth running of Pusat Kokurikulum, Universiti Malaysia Kelantan (UMK). However, managing instructors who are not attached to the university has always been a great challenge to Pusat Kokurikulum. From information dissemination to getting teaching payment, the center has to ensure that no instructors are left behind. Based on UMK policy, external instructors are not granted the access to the official university LMS system and this makes it very tedious to reach out to all 65 over external instructors especially within limited time, in addition to 30 UMK instructors appointed by Pusat Kokurikulum. This situation becomes more complex during the time of Covid-19 pandemic where face-to-face coordination meeting is impossible. The external instructors too are having exponential difficulties to connect to the center and UMK students. All these issues have driven the center to innovate a new system called e-FASI. e-FASI is a UMK LMS integrated system that is built to ease many processes for all instructors and also the administrative staff of Pusat Kokurikulum. With its user-friendly interface, e-FASI's main features are to allow easy access to the personal profile of each instructor, application to teach, course structure and information, attendance, claim for payment and most importantly preparation and submission of the paperwork for student's final project. This e-FASI system carries high commercial value especially because the system is integrated with the official LMS, fluid and can be replicated by any faculties or organizations in need of external staff management.

Key words: education management, learning management system, external staff management

Introduction

Coming from different academic and social backgrounds with wide range of knowledge in their specialized area, external instructors are vital to ensure the smooth running of Pusat Kokurikulum, Universiti Malaysia Kelantan (UMK). However, managing instructors who are not attached to the university has always been a great challenge to Pusat Kokurikulum. From information dissemination through getting teaching payment, the center has to ensure that no instructors are left behind. Based on UMK policy, external instructors are not granted the access to the official university LMS system and this makes it very tedious to reach out to all 65 over external instructors especially within limited time, in addition to 30 UMK instructors appointed by Pusat Kokurikulum. This situation becomes more complex during the time of Covid-19 pandemic where face-to-face coordination meeting is impossible. The external instructors too are having exponential difficulties to connect to the center and UMK students. All these issues have driven the center to innovate a new system called e-FASI.

As suggested by Musdalifah et al. (2021), having the best design for blended learning environment is important not just for students to be able to adapt but it is vital for maintaining high motivation among instructors. On the other hand, Oguguo et al. (2021) has found that although instructors

are motivated to teach the students during class time, a learning management system that is not user friendly would affect their interest in engaging in non face-to-face activities and this consequently led to negative on the students performance. Having these concerns in mind, the e-FASI system has been developed to provide the best learning environment for UMK students. As most instructors are externally hired, maintaining motivation to teach is done by the e-FASI system by giving them ownership to the course and students that they teach.

e-FASI is a UMK LMS integrated system that is built to ease many processes for all instructors and also the administrative staff of Pusat Kokurikulum. With its user-friendly interface, e-FASI's main features are to allow easy access to the personal profile of each instructor, application to teach, course structure and information, attendance, claim for payment and most importantly preparation and submission of the paperwork for student's final project. This e-FASI system carries high commercial value especially because the system is integrated with the official LMS, fluid and can be replicated for any faculties or organizations in need of external staff management.

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SOCIALLY DISTANCED FIELD TRIP KIT

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Highlights: In light of the emerging need for distance learning recently, alternatives to face-to-face immersive learning are vital. In this presentation, we introduce Socially Distanced Field Trip (SDFT) kit, an economic tool that consists of templates designed for conducting virtual field trips in an immersive and engaging way. The applicability of the templates has been demonstrated for two virtual field trips, which were conducted between 30 March and 26 April 2021 during the Environmental Biotechnology course. The course was taken by 103 students of Resource Biotechnology programme at Faculty of Resource Science and Technology, UNIMAS. The initiative has resulted in positive feedbacks from the students indicating the promising utility of SDFT kit for present and future applications in distance learning.

Introduction

With the shift of global education towards virtual learning since the pandemic gripped the world in 2020, there is an emerging need for alternative strategies to cater different aspects of teaching and learning (T & L). One of the T & L activities that requires an alternative approach during distance learning is field study. In science, field study is one of the important T & L components that can help to facilitate student understanding through immersion of processes at the field (Zhao et al., 2020), which plays an important role in increasing learners' motivation and enjoyment (Makransky and Lilleholt, 2018). However, with the infeasibility of physical T & L activities due to the pandemic, the traditional field study has to be substituted with an alternative approach. The challenges of virtual field trip nevertheless lie in the degree of the immersion, student engagement as well as the digital divide. Although 3-dimensional technologies such as virtual reality (VR) can serve as a highly interactive tool for conducting virtual field trips, nonetheless, the high cost as well as the limitation of the resources still remain amongst the major bottlenecks of its wide adoption especially in developing and underdeveloped countries. Hence, there is a need for a more affordable approach that can provide virtual fieldwork experience. The initiative presented here highlights Socially Distanced Field Trip (SDFT) kit, an economic tool for conducting virtual field trips in an immersive and engaging way, which was designed using inexpensive digital applications.

Description

Context and background
Socially Distance Field Trip Kit consists of several templates that are designed to cater virtual field trips in an immersive and engaging way. Each of the templates has several main sections such as information centres, check points and video slots. The whole templates and the sections embedded into them were created using low-cost digital tools such as Google slide, Genially,

Google form, Mentimeter, Instagram and YouTube. The invention is important to education as it can be benefitted by educators for conducting virtual field trip replacing the physical field trip during distance learning.

Advantages of the innovation

The invention offers several advantages to both educators and students. From a teaching perspective, the templates can be designed easily by educators using low-cost digital tools. Using two-dimensional technology, the invention does not require expensive tools unlike those platforms that use three-dimensional technology. From the learner perspective, the platform can also be accessed easily without huge investment for additional gadgets and data. Secondly, the platform provides self-paced and personalised learning experience to the learners. Furthermore, the information delivery is designed to be in bite-sized mode, representing microlearning, a successful paradigm that is proven effective in reducing cognitive load (Horst, 2020). These features can help to increase the student understanding on the subject matter and therefore reduce their stress. The incorporation of check points in the templates in the form of various activities makes the trip interactive and this can help to promote student engagement throughout the field trip. With regard to the applicability of the invention, the templates can be uploaded to various platforms such as social media, email and e-learning portals. Moreover, the invention can be easily applied for a large number of students across both science and non-science fields.

Methodology

We created the templates using two main platforms namely Google Slide and Genially. Every template is a set of slides consisting of several main sections namely information centre, video slot and check point. The information centre serves as a section for posting brief facts related to the subject matter. The information can be posted in the form of video, infographic, brief notes or links to social media posts. Video slot is a section that features the demonstration video of the field trip. Several video slots were prepared in the same template in order to include the bite-sized demonstration videos. In this work, we posted links of YouTube videos in the video slots. Check point is a section for recording student engagement through several activities. We created the activities in the form of short quizzes using Google Form and Mentimeter. The finished templates can be uploaded to e-learning portals, social media and email. The whole template will be viewed by the viewers as a series of slides (Figure 1) featuring the aforementioned sections, which can be accessed at their pace. The feasibility of the SDFT templates was exemplified for two virtual field trips to recycling centre and wastewater treatment plant, which were conducted between 30 March and 26 April 2021 during the Environmental Biotechnology course. The course was taken by 103 students of Resource Biotechnology programme at Faculty of Resource Science and Technology, UNIMAS. Following the field trip, a survey was conducted in order to obtain feedbacks from the students.
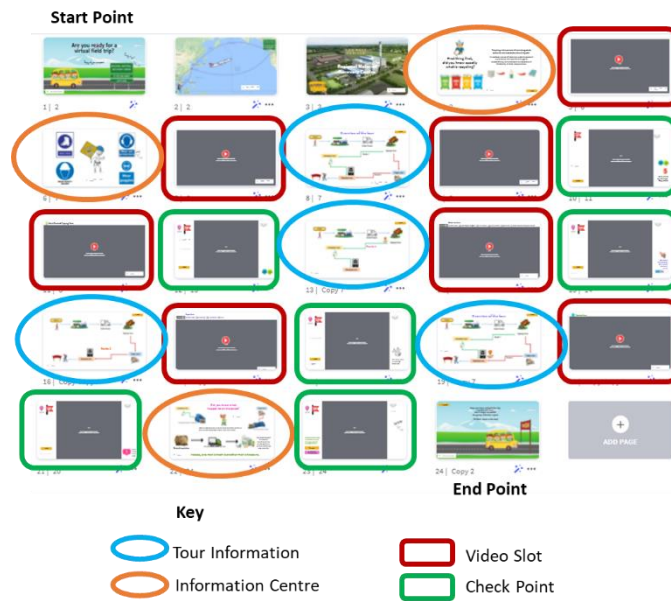
Figure 1: Overview of one of the SDFT templates created using Genially.

Outcomes

Table 1 summarises the perception of the surveyed students on the two virtual field trips conducted using the SDFT templates. In general, the survey showed that the initiative has resulted in high percentage of agreement (>95%) with regard to the acceptance of the virtual field trip in terms of the flow, instruction, duration and content covering the benefits of check points, information centres and bite-sized video demonstrations. Moreover, all respondents agreed that the self-paced feature of the virtual field trip was an advantage. The survey also showed that all respondents agreed that the initiative of conducting virtual field trip using the SDFT templates should be continued in the future. The positive response from the participants clearly showed the excellent acceptance of the conduction of virtual field trips using the templates from SDFT kit.

Commercialisation Potential

The SDFT kit has a potential to be copyrighted and repackaged for reselling in online marketplaces.

Table 1: Perception of the surveyed students on the two virtual field trips conducted using the templates from SDFT kit

Survey statement	Percentage of survey respondents in agreement (%)
The field trips are understandable in terms of the flow, instruction and content	97.3
The checkpoints created during the field trips have increased the engagement during the trip	98.7
Information centres as created in the template have helped to convey related information effectively	96
Bite-sized demonstrations, which are presented by the video slots in the template have eased the understanding of the subject matter	100
Duration of both field trips is acceptable	97.3
The self-paced feature of the virtual field trips is beneficial	98.7
Virtual field trips using the SDFT templates should be continued in the future	100

Conclusions

In conclusion, the feasibility of the SDFT kit for catering virtual field trips was clearly proven. The positive feedback received from the participants have clearly showed the promising utility of the kit in bridging the learning between the field and classroom. The main advantages of SDFT kit such as ease of use, low cost, effective bite-sized and engaging learning tool and high scalability has made it as a promising e-learning approach that can be potentially applied across academic disciplines and institutions.

Acknowledgements

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SejarAR: MOBILE AUGMENTED REALITY APPLICATION TO ASSIST HIGH SCHOOL STUDENTS LEARNING HISTORY

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Highlights: In 2013, History is made to be a must-pass subject for Sijil Pelajaran Malaysia. Few studies about learning history have been reported to be boring, dull, dislike history and hard to understand. Also, teachers described a lack of creativity as one of the challenges they faced to deliver this subject. Moreover, the current history textbooks used were static and less interactivity and engagement between the text and the learner. This project aims to develop a mobile alternative learning tool that will leverage the immersive nature of augmented reality. Hence, the results obtained from this application seems to positive towards learning history with AR compared to learning with other mobile learning application without AR.

Key words: Augmented Reality, Mobile App, Learning Experience, History, Secondary School Students, Malaysia.

Introduction

The Fourth Industrial Revolution (IR 4.0) is expected to change how we live, work, study and communicate; it is also likely to change the things we value in the future. Presently, we can already see changing business models, learning & teaching mediums. History is a must pass subject in Sijil Pelajaran Malaysia (SPM) (Bernama,2010). The failure of the subject can delay a high school student to further their education to a higher level. A recent study collected opinions from 45 students in 2 groups on perception of history subject in school shows that a staggering of 75% and 64% student do not like history in school and 45% of those dislikes mentioned it as not interesting, 22% mentioned that it is hard to understand (Taharim et al. 2015).The lack of creativity in delivering the history lesson contributes to the boredom of students (Zin et al. 2009)]. Learning experience can become the hindrance between student and knowledge. A study also reveal that text books ranked amongst the lowest (15.6%) of preferred learning medium amongst students and ironically it is the primary way of teachers delivering study materials and contents to students (Taharim et al. 2015). Furthermore, there are currently lack of available innovative solutions for the students to learn history through mobile devices (Taharim et.al 2015)]. Most application are just a digital version of exam questions or text-book in a mobile or digital format which does not help motivate the students to learn history, because they are essentially doing the same thing on different platform. Table 1 shows the summary of the problems, solutions and SejarAR features.

The aim of this project is to develop a mobile alternative learning tool which will leverage on the immersive nature of augmented reality (AR). The approach taken for this work is using the Agile methodology due to its flexibility and interaction between developers and students. The results obtained from this application seems too positive towards learning history with AR compared to learning with other mobile learning application without AR. With the comments from an

experienced teacher there seems to be a future for SejarAR mobile AR application to be developed as a self-directed learning tool for Malaysian high-school students. In response to the problems mentioned, an augmented reality (AR) mobile application for high school students will be proposed as a solution to bridge the gap between the history subject in school and students.

SejarAR mobile app is very important to education because it will fulfil the demand of act as an exciting text-book or reference book for students. In addition it will add more value to teaching. Due to current situation, SejarAR mobile app will assist student in their study pertaining to student different learning styles.

Some advantages highlighted in this work toward education and community are: improve student engagement and interest, fun and interactive learning and follow KSSM syllabus.

We believe that SejarAR mobile app has a potential to be used as an alternative future digital Sejarah text- book or reference book leveraging the AR technology to high-school students in Malaysia, teachers as well as book publishers. To date, our observation.

Table 1: Overview of Problems, Solutions and Features of SejarAR

Problems	Solutions	Features
Not Interested	Increase Engagement Interaction	Interactive application
Cannot Remember	Integrate with Image and Video	Enhance learning with multimedia Provide an Augmented Experience
Hard to Understand	Dynamic Information	Gamification of Content

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MALAYSIA LINGO: AR APPS EMBEDDED BOARD GAME FOR THE LEARNING OF MULTIRACIAL LANGUAGES

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Highlights: Malaysia Lingo is a multilingual Augmented Reality (AR) App with customizable board games for multi-level skills of user, flashcards and writing cards. Users can learn up to four languages (Malay, English, Mandarin and Tamil). Using Malaysia Lingo, users can practice all four skills needed in language learning: listening, speaking, reading, and writing. Malaysia Lingo AR app can encourage interactivity and engagement of learners, while customizable board games can let users practice valuable social skills and offer the opportunity to master more languages. Therefore users can use Malaysia Lingo to improve their learning outcome through increased engagement, motivation and interactivity.

Keywords: Malaysia Lingo, multiracial language, Augmented reality, vocabulary

Introduction

Malaysia is known for being a multilingual country. Most Malaysian, especially the younger generation, are multilingual and can speak several languages with varying fluency. According to Education Ministry statistics, non-Chinese students comprised 18% of Chinese-language primary schools in 2016, or almost 1 in 5 students (Kate Ng, 2017). However, there are limited resources to learn the four main languages in Malaysia (Malay, English, Mandarin, and Tamil). Therefore, this app and learning kit was designed especially for students who want to learn any of the main four languages widely spoken and used in Malaysia. Speaking multi languages can keep our brains healthy as we age. It has multiple benefits for children, such as giving them an academic advantage and improving their employment prospects once they leave school. Moreover, multilingualism gives us access to more than one culture and improves our understanding of our own cultures (Ollerhead & Leech,2019). In conclusion, Malaysia Lingo is the best tool for children to learn different languages by using the augmented reality (AR) applications, board games, flashcards and writing cards that will offer an exciting and unique learning experience.

Content

Malaysia Lingo AR App and learning kit were designed with a simple interface for young learners to have a fun environment to learn languages with AR technology. A gamified learning design embedded with AR technology is the approach of Malaysia Lingo AR Apps. For the AR app, user can choose the vocabulary of any of the four languages they would like to learn. User can scan the marker to see AR fruit. The AR fruit can be resized and rotated. The App will read the name of the fruit twice, and the word for the fruit will be pop up on the screen as well. After they have learned the vocabulary, user can take the multi-language quizzes in the App for self-assessment. For now, there will be only fruits vocabulary, and in the future, innovators will add more categories to this App.

The board game is customizable. User or educator can arrange the blocks to create their own game according to the level of the user. Innovators use cute Emoji toys as markers of the board game to attract users' attention. Players can use the special dices designed for the board game to decide on the language(s) they would like to learn. Other components in the board game are: (a)different blocks (picture/colour/name of the fruits); (b)Treat and Trick cards for rewards and punishment; (c)flashcards; and (d) rewritable writing cards. There are multi-level board games that can suit the need of players while practising listening, speaking, reading, and writing skills through the games.

Malaysia Lingo works based on the framework of activity theory for mobile learning by Frohberg et al., 2009. Malaysia Lingo has covered all the six factors in this framework, which are tool, subject, control (rules, context (community), communication (division of labor) and objective. A study by ChungHwang, & Lai, (2019) has found that mobile devices were considered a primary way of allowing students to acquire self-learning materials rather than only mediation learning across contexts by using Malaysia Lingo, the learners can learn actively to construct knowledge independently in a fun environment setting beyond the traditional classroom setting.

Malaysia Lingo has many benefits. Its user-friendly apps and board games will increase students' participation in learning and enhance the learning experience. Malaysia Lingo can keep the users highly motivated, and it encourages collaborative learning. A study conducted by Shaharom and Abdul Halim (2016) has confirmed that there are positive impacts of AR in early childhood education, and it can significantly help students learn. They have suggested that educators consider integrating AR in teaching and learning as 21st-century children use mobile devices daily.

This AR app that comes with learning kits has the potential to be commercialized as one of the tools that help young children learn multi-languages. Malaysia Lingo has obtained copyright from Putra Science Park, UPM and MyIPO in 2019. This innovation reached Technology readiness level (TRL) Level 5, and we are looking for ways to reach TRL 9. So far, no AR apps with four languages available on the market as well.

Figure 1: Malaysia Lingo AR APP and learning kits
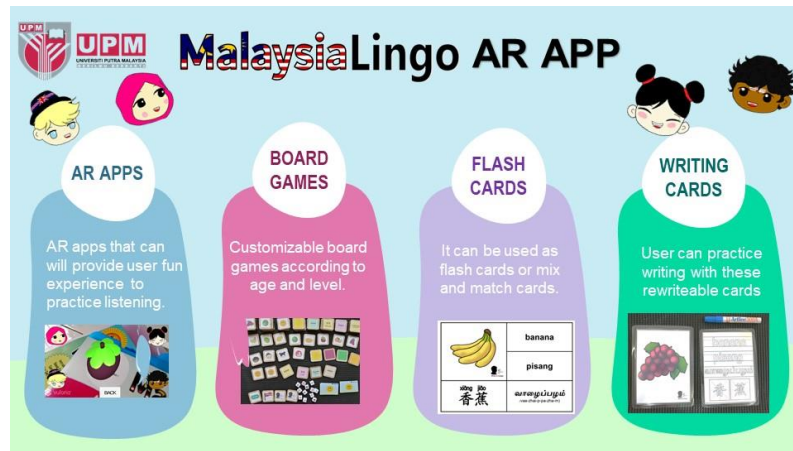
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ROBOBUG: AN UNPLUGGED APPROACH TO COMPUTATIONAL THINKING

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Highlights: Computational thinking literacy is essential to prepare students for future life and work achieved by IR 4.0. Therefore Robobug was innovated as a board game aimed to helps children explore and hone computational concepts and practices. Robobug supports coding literacy like structural programming. By playing Robobug, players can learn how to solve problems and cultivate computational thinking effectively. Educators can use Roobug to integrate collaborative and game-based learning in their teaching practice to increase students' interaction and learning achievement. Thus, Robobug can be a helpful tool and alternative approach to cultivate computational thinking among students.

Key words: Robobug, computational thinking, board game

Introduction

To prepare students for future life and work achieved by IR 4.0, where more smart robots will supplant people in certain activity divisions, students need to learn computational thinking and coding to communicate with computers to most effectively harness their computer power (Shahroom & Hussin, 2018). Successful communication along these lines is called computational thinking (Shute, Chen Sun, & Clarke, 2017). Computational thinking and coding are essential for everyone in the 21st century. Malaysia government has integrated Computational Thinking skills in the curriculum through Asas Sains Komputer (Basic of Computer Science) subject in public schools since 2017. Robobug board game can be used as an unplugged tool to develop the computational thinking skills that align with the content in the syllabus of Asas Sains Komputer subject. The schools in Malaysia's rural area that lack ICT infrastructures can use this tool to deliver the lesson in computational thinking through game-based learning. Yu and Roque (2019) have presented a review of 30 sets of computational toys and kits that enable young children to explore computational ideas and practices. Their study showed that many kits allow exploring computational concepts and practices and the opportunities to expand the new concepts and domains children could explore. A study by Kuo& Hsu (2019) showed that an unplugged computational board game named Robot City could increase students' desire to learn and improve their learning achievement. Previous studies have shown that many activities that develop computational thinking can be done "unplugged," meaning away from computers. Playing games with rules, doing logic puzzles and creating and following recipes are ways that Computational Thinking can be done "unplugged". Thus, Robobug can be used as an unplugged approach to help children explore and hone computational concepts and practices.

Content

Approaches to promote computational thinking have become a hot research topic since Jeannette Wing's article "Computation thinking" published in 2006 (Angeli & Valanides, 2019). There are four key techniques in Computational Thinking (CT) as decomposition, abstraction, pattern recognition and algorithms. The players can develop their CT skills in the Robobug gameplay. When the player helps the Robobug get the treat by overcoming all the obstacles, they develop decomposition kills. Players build their pattern recognitions while they observe the movements on the Robobug during game time. Players develop their abstraction skills while simplifying the steps by keeping only the essential steps and avoid/overcome unnecessary obstacles. Lastly, players developed algorithms skills while developing step-by-step instructions to complete all levels with as few steps as possible. They may also use the loop function to create repeatable patterns. While playing, kids learn essential life skills such as breaking big problems into small steps, working backwards from goal to solution, visualizing multiple solutions, perseverance, and experimentation and most importantly, patience.

Robobug was developed based on the Conceptual framework of interest loop from Interest-driven creator theory. This board game is used to trigger students' interest. When students are fully immersed in the board games, they maintain high confidence in balancing the perceived challenges and skills. Lastly, when players start to make sense of their experience in playing Robobug and relate what they have learned to their daily life, they enter extending interest phase. If players believe that their accomplishment of a task is meaningful, they will become more self-motivated and make an extra effort to complete the job. As such, it will increase students' desire to learn and thus improve their learning outcomes.

Robobug supports coding literacy and explores computational concepts and practices. As they play this game, players will learn to:

Use commands and understand their outcomes

Combine commands to form a line of code read a line of code and execute it create and use functions to improve efficiency encounter bugs, then examine code and edit accordingly.

The educator can use Robobug to be an unplugged tool while conducting CT lessons. This unplugged approach might overcome insufficient computers and faculties in some schools, especially schools in rural areas. Lastly, the educator can use Robobug to create a fun learning environment for the learners while promoting computational thinking skills and concepts.

Robobug has the potential to be commercialized as one of the learning kits that help young children explore and hone computational concepts and practices.

Figure 1: Components in Robobug board games.
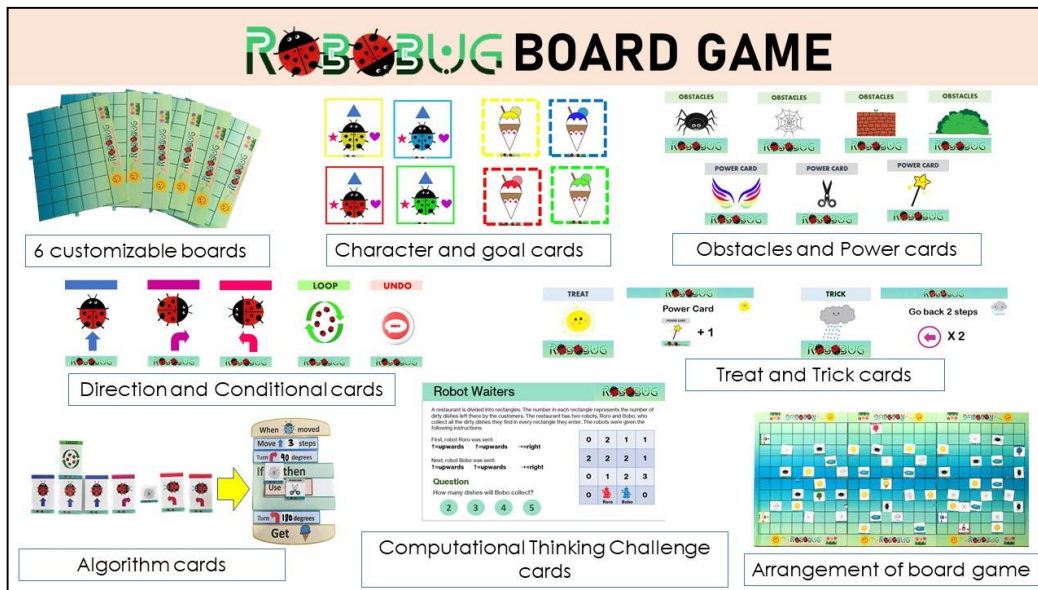
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MOOCs: EL-HADEEQA EL-ARABIYYA

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Abstrak:

El-Hadeeqa El-Arabiyya merupakan laman web pendidikan yang dibangunkan khusus untuk pembelajaran bahasa Arab peringkat pertengahan melalui empat kemahiran bahasa. Inovasi ini adalah hasil integrasi di antara pembelajaran teradun dan pembelajaran kendiri melalui medium Open Learning USIM MOOCs. Objektif El-Hadeeqa El-Arabiyya adalah menyediakan platfom pembelajaran bahasa Arab atas talian secara interaktif dengan menawarkan konsep pembelajaran moden dan terkini seiring dengan kehendak universiti dan keperluan revolusi industri 4.0 (I.R 4.0). Ini secara tidak langsung dapat meningkatkan motivasi serta penguasaan kemahiran bahasa Arab pelajar. El-Hadeeqa El-Arabiyya mempunyai empat topik utama yang disusun mengikut kemahiran dan dipecahkan kepada 16 sub topik. Di dalam kursus ini, pelajar dapat merasai pengalaman pembelajaran bahasa Arab alaf baru melalui aktiviti bahasa, seperti mendengar audio, perbincangan kumpulan, pembacaan teks dan penulisan karangan dengan menggunakan aplikasi-aplikasi atas talian yang pelbagai bagi menjadikan proses pembelajaran dan pengajaran yang lebih interaktif dan efektif.

Kata kunci: *MOOCs, Bahasa Arab Pertengahan, Teknologi, Kemahiran Bahasa Arab,*

Pendahuluan

Penggunaan Massive Open Online Courses (MOOCs) sebagai salah satu pendekatan yang tidak asing dalam proses pengajaran. Walaupun terdapat pelbagai isu dan cabaran yang telah diperkatakan sejak penggunaan MOOCs dilaksanakan (Zulkifli, N. et al., 2020), namun menjadi tanggungjawab semua pihak terutama warga pendidik dan pembangun teknologi pendidikan untuk terus memperkembangkan lagi penggunaannya selaras dengan dasar Pela Pembangunan Pendidikan Malaysia 2015-2025 bagi Pendidikan Tinggi (Ahmad Fkrudin et al., 2019). Penggunaan MOOCs sebagai medium pembelajaran dilihat semakin berkembang dengan adanya penawaran kursus yang pelbagai dan mula mendapat perhatian secara meluas selepas pandemik Covid-19 yang melanda negara, menjadikan MOOCs sebagai salah satu platform pembelajaran di universiti. Mengambil peluang ini, El-Hadeeqa El-Arabiyya dibangunkan khusus untuk pembelajaran kemahiran bahasa Arab secara integrasi yang menggabungkan konsep pembelajaran teradun dan pembelajaran kendiri menggunakan medium USIM MOOCs.

Proses Pembangunan Kursus.

Mengambil kira kepentingan bahasa Arab sebagai kursus wajib di Universiti Sains Islam Malaysia, pembinaan El-Hadeeqa El-Arabiyya ini dibangunkan dengan menggunakan model ADDIE. Pemilihan model ADDIE adalah kerana ia menawarkan kerangka teori yang lengkap

untuk pembangunan kursus dan juga kepada pembinaan projek digital (Peterson C, 2003). Berikut adalah jadual bagi proses pembangunan kursus:-

ANALYZE	DESIGN	DEVELOP	IMPLEMENT	EVALUATE
Maklum balas pakar bidang (tenaga pengajar) Adaptasi modul Maklum balas pelajar	Pembelajaran kendiri modul (SIM) Integrasi silibus subjek	Integrasi pembelajaran teradun & pembelajaran kendiri Penggunaan web 2.0 Penghasilan video dan audio	USIM MOOCs Pengajaran & pembelajaran di MOOCs	Respon pelajar Respon tenaga pengajar

Jadual 1: Proses Pembangunan El-Hadeeqa El-Arabiyya

Proses Pembelajaran di El-Hadeeqa El-Arabiyya

El-Hadeeqa El-Arabiyya menawarkan pembelajaran Bahasa Arab peringkat pertengahan melalui empat kemahiran bahasa yang disusun di dalam empat topik utama iaitu kemahiran membaca, mendengar, bertutur dan menulis. Pelajar akan menjalankan aktiviti pembelajaran melalui pembelajaran kendiri, nota, gambar rajah dan video yang disediakan.

Kemahiran membaca: Pelajar didedahkan dengan pembacaan dan pemahaman teks. Teks bacaan yang disediakan adalah berkaitan dengan diri, kesihatan dan sosial.

Kemahiran mendengar: Pelajar didedahkan dengan teks mendengar dan pemahaman teks seperti perbualan, cerita, debat dan fakta.

Kemahiran bertutur: Pelajar diberi pendedahan kepada kemahiran menjalankan dan mengendalikan perbincangan berkumpulan. Pelajar diberikan contoh-contoh gaya bahasa yang boleh digunakan sewaktu perbincangan melalui sampel audio dan video. Penggunaan audio dan video ini bagi memastikan para pelajar dapat meniru penggunaan gaya bahasa yang betul.

Kemahiran menulis: Pelajar didedahkan dengan teknik menulis yang lebih berfokus dalam pembinaan perenggan dan penyusunan idea.

Set pengukuhan juga turut disediakan bagi memastikan pelajar memahami apa yang dipelajari. Sebelum ujian penilaian akhir diberikan kepada pelajar, set ulangkaji akan diberikan bagi membantu pelajar bersedia dengan penilaian yang sebenar. Pelajar juga dapat berkomunikasi dengan fasilitator sekiranya mempunyai sebarang pertanyaan dan maklum balas melalui platform yang disediakan. Berikut adalah gambar rajah yang menunjukkan proses pembelajaran dalam El-Hadeeqa El-Arabiyya:
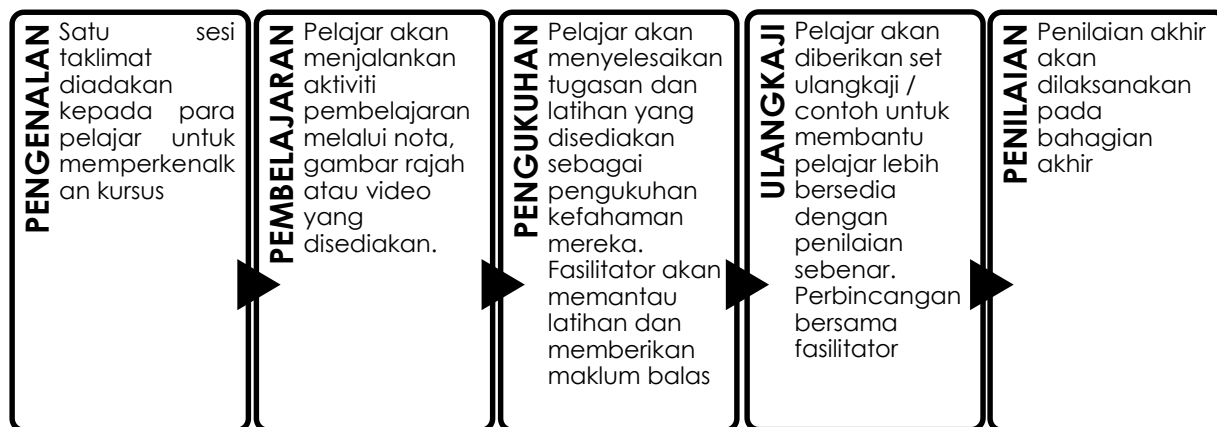
Rajah 1: Proses Pembelajaran dalam El-Hadeeqa El-Arabiyya

Kepentingan kepada pembelajaran dan pengajaran Bahasa Arab?

El-Hadeeqa El-Arabiyya dapat memenuhi keperluan revolusi industri 4.0 dengan menawarkan satu konsep pembelajaran Bahasa Arab berasaskan teknologi secara interaktif, efektif dan fleksibel bersesuaian dengan keperluan pendidikan masa kini.

Keistimewaan El-Hadeeqa El-Arabiyya

El-Hadeeqa El-Arabiyya menyediakan peluang pembelajaran kepada pelajar yang telah mempunyai kemahiran bahasa Arab di peringkat pertengahan seperti pelajar lepasan sekolah menengah agama, pelajar yang akan menduduki Ujian Kecekapan Bahasa Arab (IKLA) atau orang awam yang mempunyai kemahiran asas bahasa Arab. Penggunaan 80% bahasa Arab sebagai bahan utama pembelajaran disokong dengan penggunaan bahasa Inggeris sebanyak 20% amat membantu pelajar dalam meningkatkan tahap penguasaan bahasa Arab secara maksimum. Keistimewaan El-Hadeeqa El-Arabiyya ini juga dapat dilihat melalui konsep utamanya iaitu "Taman Bahasa Arab" di mana bahan pembelajaran yang disediakan sangat menarik, ceria, mesra pengguna serta fleksibel yang pastinya akan memberi pengalaman pembelajaran yang berbeza dan menyeronokkan. Selain itu, para pelajar juga dapat mengasah keempat empat kemahiran Bahasa Arab dengan hanya melayari satu kursus sahaja.

Kebolehgunaan El-Hadeeqa El-Arabiyya

Kursus ini amat sesuai dijadikan sebagai kursus jangka pendek bagi setiap kemahiran yang ditawarkan. Kursus ini juga sesuai diambil sebagai persediaan bagi pelajar yang akan menduduki Ujian Kecekapan Bahasa (IKLA) selain menjadi platform alternatif kepada pengajaran dan pembelajaran di universiti dan sekolah.

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TEACHING AND LEARNING ACTIVITY FOR SYNCHRONOUS ONLINE CLASS

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Highlights: To attract students' interest in learning Electronic Devices and Circuits course, several activities have been implemented within 8 weeks. These include conducting virtual experiment using MultisimLive/Tinkercad for diode topic, implementing group discussion via Webex - Breakout room, self- directed learning for BJT topic using Metaverse AR Apps, and inviting a guest speaker from industry for in class forum. The main aims of these activities are: (i) to boost the students' interest and motivation towards this course, (ii) to enhance students' understanding of the topics learnt, and (iii) to expose the students with different learning experience and environment. A mid-semester reflection was received from 32 students indicate student satisfaction towards the implementation of these activities during class, which lead to greater their learning experience and motivation. In summary, proper management of synchronous online class is necessary to create a virtual learning atmosphere that will give positive impact on student content of knowledge and create conditions for effective learning process. The feedback gathered would be helpful for improvement in the next implementation in the remaining weeks in the current academic calendar and in upcoming students' cohorts.

Key words: synchronous; self-learning; active; electronic.

Introduction

COVID-19 has dramatically reformed the way global education is delivered. Millions of learners were affected by educational institution closures due to the pandemic, which resulted in the largest online movement in the history of education. It forced the instructors and the learners to adopt with new paradigm of classroom. With the use of many online conferences platform available such as Webex, GoogleMeet and many more, also various apps and tools will create a meaningful learning experience.

In electrical and electronics engineering course, there are number of ways to convey knowledge to the students electronically. For example, (Teodor & Adrian, 2018) have demonstrated a blended learning approach applied to electrical engineering courses which have positive impact to the student. In another work by (Huang & Zhang, 2017), the used of e – learning platform for blended leaning in power electronics course can benefit student in terms of knowledge retention and achievement. Another issue is how the instructors get preparing themselves with this new classroom norms (Korkmaz & Toraman, 2020).

Due to that, it is important to know the suitability of activities implemented during synchronous online class for electronic devices and circuits towards students. Besides, attracting their interest to learn more about this course, it also crucial to contribute to their knowledge and learning motivation.

Design on Online Learning Activities

Basically, there are 40 students in this course, however only 32 feedbacks received from their mid-semester reflection towards activities implemented within 8 weeks in this course. The description of the activities involved are listed in Table 1 below.

Table 1: Teaching and Learning Activity for Synchronous Online Class

Activity	Description
i. Virtual experiment using MultisimLive/Tinkercad	The instructor gives a demonstration in getting started using MultisimLive and Tinkercad in class with some basic diode circuits as examples. Then, students were assigned into group to explore the operations of diodes by experimenting virtually at different condition. The observations by students were concluded in a brief report form.
ii. Webex - Breakout room discussion	Group discussion for some subtopics and exercise had been arranged via Webex - Breakout room. Students were given about 10 to 15 minutes for discussion with peers before return to main meeting for wrap-up by instructor.
iii. BJT – Self-directed learning using Metaverse AR Apps	A series of tasks were scheduled for the students to explore within a specific duration. There is also a quick quiz to self- assess their comprehension about the topic learned. Element of fun and excitement during learning was introduced via augmented reality apps.
iv. Guest Speaker from INTEL	A guest speaker from industry was invited for 60 minutes forum session. There is a chance for students to get some viewpoints from an engineer related to semiconductor field and preparation before graduating.

Result and Discussion

To see the perception of students after the activities, their feedback was gathered before mid-semester break. Figure 1 displayed the result showing students satisfaction (agree and strongly agree) for respective activity. From Figure 1, most of them preferred most in guest speaker and virtual experiments activities, while averagely agreed for the other two activities.

Guest Speaker from INTEL

BJT - Self-directed learning using
Metaverse AR Apps

Webex - Breakout room discussion

Diode - Virtual experiment using
MultisimLive/Tinkercad

0   5   10   15   20   25   30   35
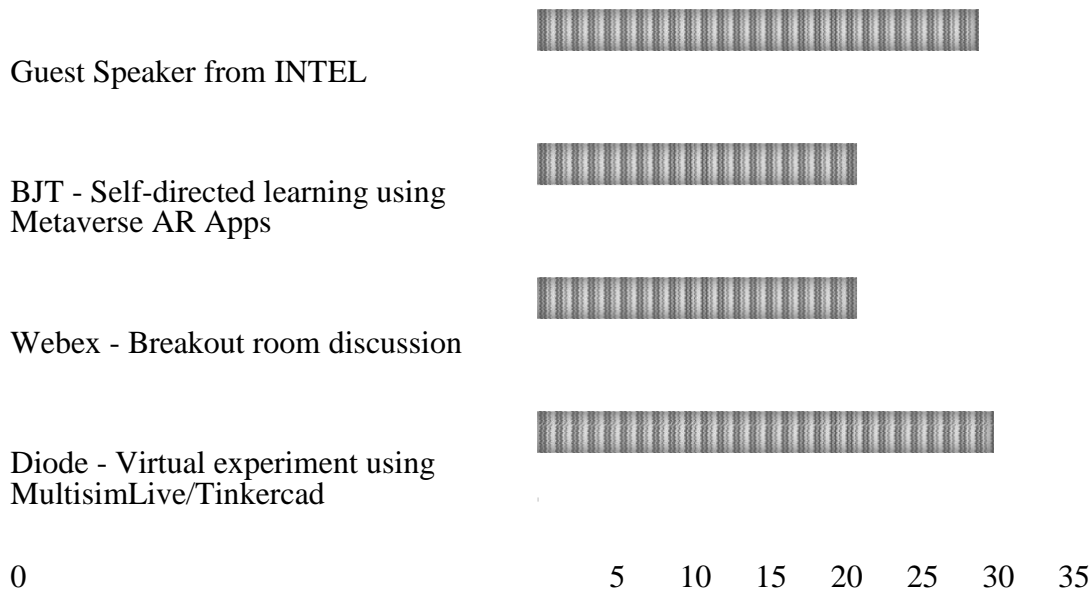
Figure 1: Number of students feedback who agree and strongly agree with
respective activities implementation.

Table 2 listed some excerpt from the student collected when all the activities have been done. Based on the feedback, they enjoy the guest speaker activity as commented by R9, R23 and R31. The virtual experiments activity carried out using Multisim and Tinkercad software is also found motivating by some of the student like R9. Besides, the use of AR for teaching and learning can also help the student to improve their learning.

Table 2: Excerpt from Student Feedback Indicating Learning Motivation

Student	Reflection Excerpt
R9	"Guest inviting activity is really good. Simulation is also fun"
R10	"Those activities can make myself learn more about this course"
R12	"The activities are quite new for me especially the Intel speaker, i learnt new things. As well the multsim experiment, because in previous semester i used Tinkercad."
R13	"I Love the guest speaker activity, make we wanna do more"
R23	"The Guest Speaker from INTEL is quite good and interesting"
R27	"I find the Metaverse AR apps is such interesting way to learn even I was struggling to using it at first"
R29	"Quite good especially the talk from Intel. I have learned more extra knowledges throughout the talk."
R30	"They are great especially group discussions."
R31	"Love the activity which guest speaker from INTEL. Love what the speaker share her experiences in INTEL"

Conclusion

This paper provides some insight on the implementation of several activities in synchronous online class based on students feedback. Getting know the level of satisfaction among students based on activity is useful to plan and improve the lesson activities that will give positive impact on student content of knowledge and create conditions for effective learning process.

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OhMyGaji: Financial Literacy Digital Game for Youth

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Highlights: OhMyGaji (OMG) is a financial literacy digital game developed to engage and educate youth on financial literacy. The game integrates the financial planning via the quest and challenge throughout the game. In addition, it includes the financial decisions that should be made by a person throughout the life-cycle that is related to finance, economics and muamalat. It covers the 36 years of working with the environment of current job market (income level, expenditure pattern, demographic structure) in the context of Malaysian economy.

Key words: Digital game, financial literacy, interactive learning, retirement.

Introduction

Malaysian tends to have low financial resilience, lack understanding on risk and return and do not practice long-term financial planning particularly among the millennial generation. Early education on financial literacy could develop attitudes and beliefs towards financial success in the future. However empirical studies show that giving too much psychological weight on money lead them to act selfishly towards their peers. The "OhMyGaji" is an innovation digital game to engage and educate youth on mapping their journey towards retirement by using game-based learning approach. The game integrates the financial planning module via the quest and challenge throughout the game. It also shares the tips of dos and don'ts with regards to financial decisions and scenarios. In addition, it includes the financial decisions that should be made by a person throughout the life-cycle that is related to finance, economics and muamalat. Moreover, values related to the responsibility of human to Allah, human to environment and human to human were instilled in the games. It covers the 36 years of working with the environment of current job market (income level, expenditure pattern, demographic structure) in the context of Malaysian economy.

Content

OhMyGaji (OMG) is a digital game that covers a comprehensive financial planning for youth. It is a new approach to expose youths to the importance of financial planning in their life. Comprehensive financial planning covers five stages which are cash flow, asset and liability management analysis; risk management; investment planning; retirement planning; zakat and income tax planning; and finally, estate and inheritance planning. The first phase of the game starts with managing cash flow, asset, and liability.

What is the context or background of the innovation / product development / design / process?
The issues of low financial resilience, lack understanding on risk and return and do not practice long-term financial planning particularly among the millennial generation have motivated us to come out with the game. The game exposes youths the concepts of risk management, investment, zakat, income tax and retirement. In this game, students imagine they have completed their bachelor's degree and need to manage their life by start looking for jobs and involve with the community. To start with, student should assume his role as the character in the game where he aims to purchase his first house. For that, the student should aim to accumulate RM40,000 as the down payment of a medium cost apartment in three years' time. While accumulating money for roof over his head, he also needs to plan for other basic needs such as physical (energy) as well as spiritual (well-being and value) needs as human beings.

Why are they important to education?
OMG integrates values related to the responsibility of human to Allah, human to environment and human to human and the financial planning. It helps youths to the important aspects of financial planning how their decisions affect their life. There are interactive video tutorial helps in engaging students to experience financial planning throughout life cycle.

Please write any advantages of your innovation / product development / design / process towards education and community.
Self-pace learning helps students to experience financial planning phases throughout life cycle. This game supports the needs of Malaysia National Strategy for Financial Literacy Blueprint 2019-2023 which focuses on three aspects of financial awareness: save, manage and protect. This would indirectly educate youth on the effect their financial decisions on the net worth.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.
To be market to higher learning institutions and government agency such as Permodalan Nasional Berhad, Bank Negara Malaysia and financial institutions. It is expected to be used a teaching and learning (T&L) tool at higher institution for subjects such as Finance and Financial Planning.
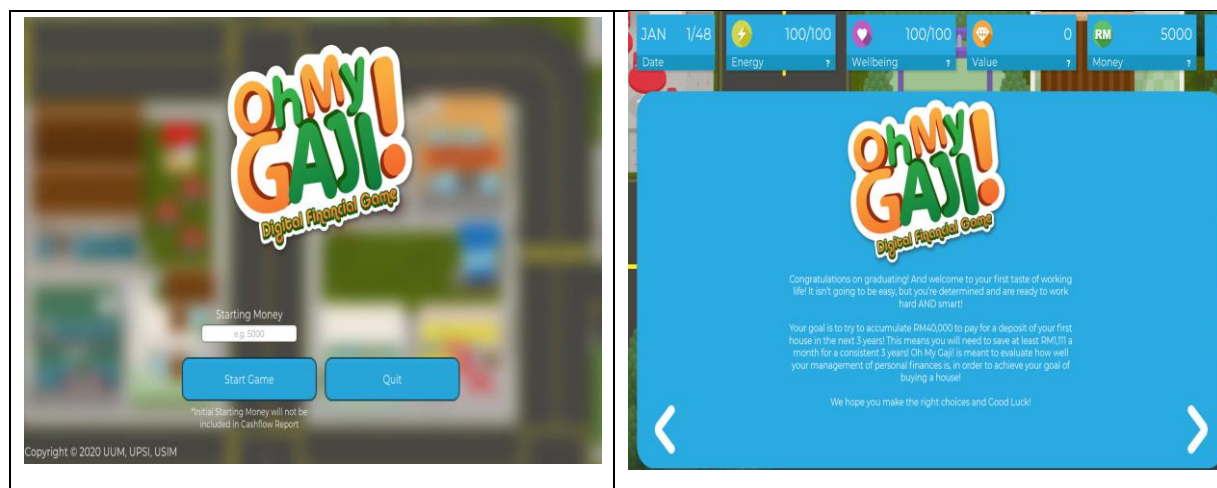
Figure 1: OMG Starting Page Interface.

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CARBONFREE: A LOW CARBON EDUCATIONAL APPLICATION

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Highlights: The global warming trend is expected to intensify in Malaysia. Nonetheless, the majority of Malaysians still unaware and unconcerned about this dangerous trend because of insufficient environmental education. Therefore, CarbonFree, a low carbon educational application is developed to enables young generation and their families to foster Low Carbon Society habits with effective and error-free computerized method.

Key words: Global Warming, Reduce Carbon Emission, Low Carbon Society (LCS), Learning Application, Multi-platform, Environmental Literacy.

Introduction

Environmental education is a mechanism that encourages individuals to discuss environmental issues, address issues, and take action to improve the environment. As a result, people gain a better understanding of environmental issues and have the potential to make intelligence and informed decisions when they come up with useful knowledge. Meanwhile, Low Carbon Society (LCS) is a society where people work together to minimize the amount of carbon dioxide emissions in any form or operation produced from everyday life and from the factory or industry production process. However, environmental education is still a critical problem in Malaysia, which is necessary in order to establish an initiative for the environment. Therefore, Iskandar Malaysia Eco-Life Challenge (IMELC) was established to create awareness of Low Carbon Society knowledge. Inspired by IMELC, CarbonFree application was launched as a multi-platform education application that provides features including modules for users to complete the challenges related to carbon emission knowledge and monitoring student performance. Next, it provides evaluate modules features to help administrators increase thier performance efficiency and an automated generated report to analyze carbon data. By using the Flutter framework and FIrebase, the application is suitable for any platform such as Android and iOS and can be used widely among administrators, teachers, students and parents. Even so CarbonFree needs to enhance the functionality of the application to maximize the usage among the young generation. The analysis was conducted to identify the requirements of the project. Besides that, Rational Unified Process methodology is used in development of CarbonFree and it is divided into several phases for easy implementation and control of changes during development. Furthermore, the literature review on existing systems and technologies is critical for ensuring quality of the product. In addition, this study case consists of Software Requirement Specification (SRS), Software Design Document (SDD), Software Testing Document (STD) and questionnaire to complete the requirement development process. As a conclusion, CarbonFree application can helps raising the awareness among the young generation toward LCS while giving the knowledge to them in tackling global warming issues.

Content

Iskandar Malaysia Eco-life Challenge (IMELC) is a product produced in the context of the Science and Technology Research Partnership for Sustainable Development (SATREPS) to solve the global issue involving many countries. IMELC started in 2013 funded by the Japan Science and Technology Agency (JST) and Japan International Cooperation Agency (JICA) as a part of a research project under the Science and Technology Research Partnership for Sustainable Development (SATREPS). The main parties involved in the project are Kyoto University, Japan, Universiti Teknologi Malaysia (UTM) and Iskandar Regional Agency (IRDA) (Phang et al., 2016). The purpose of IMELC are to create awareness of Low Carbon Society and reduce carbon emissions.

Originally, Iskandar Malaysia (IM) had implemented IMELC manually, which is by using workbooks and upgraded to online applications named CarbonFree (Hui et al., 2019). In this application, its covers from registration student and teacher, the workbooks challenge, material education and monitor progress of student. It has played a key role in increasing the use of IMELC more widely on digital platforms and indirectly, raising LCS awareness in the younger generation. However, CarbonFree just cover one of module of IMELC program which is workbook challenge and still needs for enhancement.

Therefore, CarbonFree must be enhancement to overcome deficiencies in the previous system. For the proposed system, to minimize the task for the project manager, the teachers will play the role to register and manage students and parents account. Thus, the registration of the user is independent of project managers. Because to minimize the task for the project manager and just teachers know their students better, only teachers can monitor the progress of their students and send feedback to them. Project manager able to generate report efficiently in the application.

Next, users can manage their account profile information. Students and teachers also able to view the results of workbook in CarbonFree. Other than that, this system will cover all modules like conducted manually. As for the parents, they can help to assist students finish all the challenges by having access to a workbook. In addition, this system will provide features to project managers evaluate workbooks directly through the application. Thus, this project can give a better result after enhancement the CarbonFree and be a more efficient for the user use.
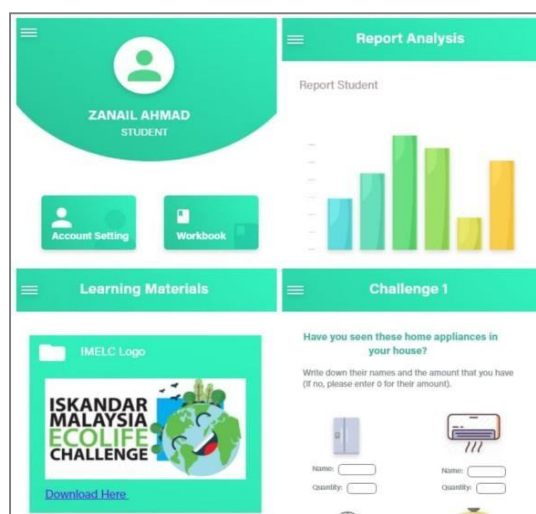
Figure 1 above shows the features in CarbonFree application.

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ACADEMIC GAMIFICATION SYSTEM

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Highlights: Academic Gamification System is a web-based application which allows the lecturers to gamify academic contents in digitized and centralized manners while serving as an interactive learning platform for the students to engage with the academic contents published by the lecturers and at the same times, embedding more gaming elements such as competitions, leaderboard and quiz into the academic contents which will be interactively engaged by the students to have a better understanding towards the academic contents.

Key words: Gamification, Web Application, Interactive Learning Environment

Introduction

Gamification in academic or education refers to the application of gaming elements and environment into the learning activities of a group of target audiences to achieve the goals for the learning activities (Huang and Soman, 2013). The results of introducing gaming elements in academic teaching and learning processes are the interactive as well as competitive learning environments that can stimulate students to achieve better academic performances during the lecture hours. Corden (2000: 35-44) highlights that interactive group learning environments can extend and refine the audiences' knowledge as well as more focus on the academic contents related to the learning objectives. The greatest advantage of embedding gamification techniques and elements into academic learning activities will be the significant boost of students' academic performance with minimal efforts spent by lecturers or teachers. While there are various types of gamification techniques and elements, the common types of them are badges, challenges, competitions, leaderboard, progress bars, quests, social networks, and teams (Choo, 2019).

Gamification is a process of embedding gaming elements such as competitions, leaderboard, interactive quiz and collaborative teams scoring into a certain aspect to encourage engagement. When it is applied to education related aspects, the entire process is referred as "Academic Gamification".

Current existing systems that support academic gamification are either manual processes or digital systems with limited gaming elements introduced to the students. As a result, it becomes a time and energy consuming task for the lecturers to embed gaming elements into academic contents, review and analyse the performance of the students during the interactive learning activities, as well as lacking sufficient gaming elements to encourage the students to be actively involved in the interactive learning environment.

This project aims to develop a web-based application which allows the lecturers to gamify academic contents in digitized and centralized manners while serving as an interactive learning platform for the students to engage with the academic contents published by the lecturers.

The software product of this project helps reduce the time and energy efforts in producing gamified academic contents by automating 90% of the processes required in organizing such activities and recording the performance data of the students while at the same times, adding more gaming elements such as competitions, leaderboard and quiz into the academic contents which will be interactively engaged by the students to have a better understanding towards the academic contents. The benefits of this software product not only capable of creating interactive learning environment, but also improving the academic performance of the students in that academic learning environment.

The entire software product was developed using the waterfall model with the complement of prototyping methodology. The reasoning behind the selection of the two methodologies is because the project has to be developed in a tight schedule but the requirements from stakeholders are already acquired and the development process of those requirements is not a complex operation. Although the waterfall development model is a suitable development methodology in this scenario, it has several drawbacks such as inflexibility in dealing with project and product risks (Adel Alshamrani and Abdullah Bahattab, 2015). It will utilize Node.js framework to construct the frontend for the web application and use MySQL as well as Firebase Cloud Firestore to handle the backend operations and storages.

The software product, which is the web application of Academic Gamification System can be commercialised by collecting monthly subscription fees or one-time membership fees from the lecturers or academic staff who wished to use our system for lecturing purposes. In order to add academic contents into the system, the user must have an active email account and a special code that is only available for the user after the transactions of membership or subscription fees have been completed. The profit earned from the collection will then be used to sustain the cost structure of Firebase Cloud Firestore's backend operations and storages.
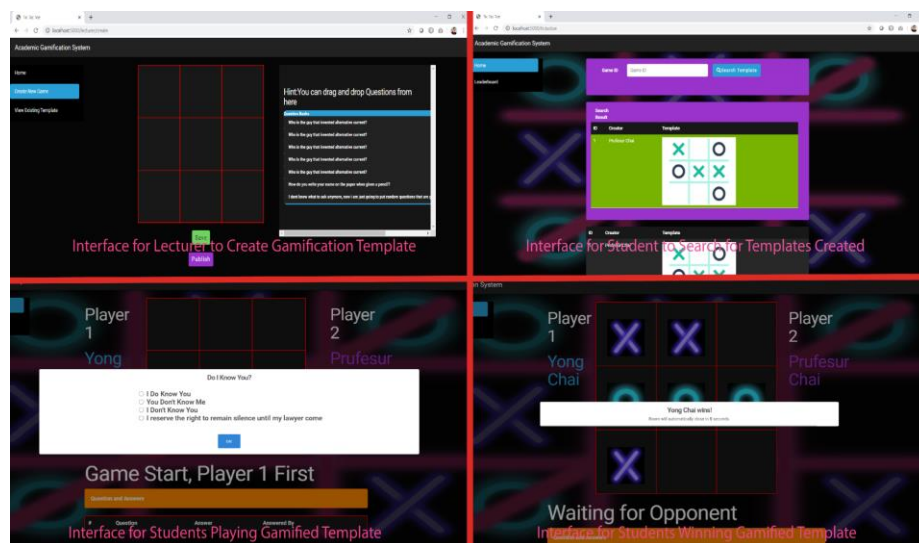
Figure 1: Example of User Interfaces of Academic Gamification System Web Application

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BioD-Ed DIGITAL LIBRARY

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Highlights: BioD-Ed Digital Library is a digital collection of e-modules specially designed to conduct home-based fieldworks as an alternative to conventional fieldworks. The e-modules are complete with manuals for both instructor and student and also rubric for assessments which are aligned to learning outcomes. The topics cover ecology, survey and monitoring, traditional knowledge, ethnobotany, plant physiology and other biodiversity-related fields. BioD-Ed Digital Library is a useful resource for remote learning as the e-modules incorporate video clips to improve student's understanding, formative assessments to enhance student's motivation and monitor progress, and hands-on activities that fulfil the required skills for psychomotor domain.

Key words: remote learning, biodiversity, fieldwork, e-module, database

Introduction

Fieldwork is an integral part of academic curriculum, particularly in the biodiversity program. Fieldwork enables deeper learning (Gamage et al., 2020; Trilestari & Almunawaroh, 2020) with real-world experience content (Winarni et al., 2021) and has significant effect upon the cognitive and affective domains of students (Scott et al., 2011). Universiti Tun Hussein Onn Malaysia (UTHM) is among the seven public universities that offer such undergraduate programs. Almost 30 to 40% of the program outcomes stress the importance of developing theoretical and practical aspects with special emphasis given to the activities that teach students experimental methods, how to synthesise observations, a range of lifelong and communication skills and field practices. However, the COVID-19 pandemic has brought a total change in many sectors including higher education, which impose many restrictions. In biodiversity conservation teaching and learning, the impact has greatly affected the implementation of field practice and teaching activities such as transforming face-to-face lectures to online teaching. As a consequence, the change has brought significant challenges to the implementation of program syllabi and contributed to a decline in the amount of field-based teaching that is available (Corlett et al., 2020; Houtz et al., 2020)

In global, most e-modules or online field practices on biodiversity-related fields are carried out by foreign academicians which were previously designed before the time of COVID-19 pandemic when on-site data collection can still be done with less restriction on health and safety issues

(Ecological Society of America, 20). Therefore, taking into this consideration, the demand to innovate e-modules that are easily available, accessible, and reliable to the students is highly required.

Description

BioD-Ed Digital Library (Figure 1) is a digital collection of e-modules specially designed to conduct home-based fieldworks as an alternative to conventional fieldworks. To date, there are ten (10) e-modules available in the digital platform. Each e-module consists of the following items; (i) manual for instructor, (ii) manual for student, (iii) rubric for assessment, and (iv) sample of projects. Each e-module incorporates on-site data collection in home backyard areas, local markets, local parks and desktop work using free online tools/datasets such as Global Biodiversity Information Facility (GBIF), ArcGIS StoryMaps, Google Earth, Youtube and other mobile applications. The e-modules provide the students with opportunities to collect, manipulate, visualize, and interpret real data as well as authentic and meaningful assessments such as live streaming, videos and e-portfolios.
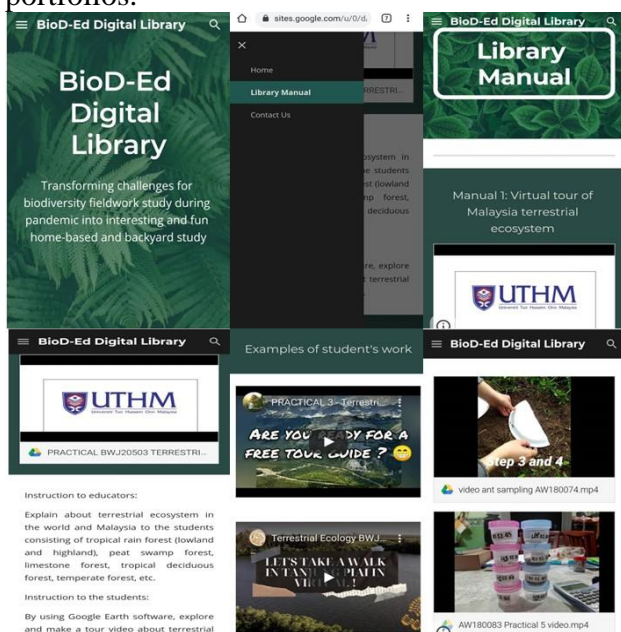
Figure 1: BioD-Ed Digital Library

Background

The goal of the BioD-Ed Digital Library is to collaboratively facilitate the discovery of high quality educational resources during the COVID-19 pandemic contributed by Malaysian researchers/academicians that will lead to a transformative undergraduate biodiversity education. This effort will be guided by education research and take advantage of new developments in digital technologies. The objectives are to (i) deliver effective, personalized technology, strategies and services to empower virtual learning communities within disciplinary societies, (ii) motivate the discovery and cataloging of scientific resources that meet educational objectives, (iii) formulate a concrete sustainability and digital library capacity expansion plan for the long term.

Importance to education

The list of e-modules in BioD-Ed Digital Library features various independent field practices that incorporate technology into field practices for biological courses, which is important to support biodiversity conservation research, teaching and learning activities. The e-modules are designed to fulfill specific learning outcomes associated with the psychomotor domain. The flexibility, practicality and quality assurance of the e-modules harness opportunity for deep changes to the future approach in education.

Advantages

Quality digital sources that allow for customizable recombination and reuse of resources.

Flexibility to students and lecturers that helps the students studying from their home by using their smartphone, tablet or laptop at their own time.

Save costs on accommodation, transport, entrance fee for field trips and do-it-yourself (DIY) concept for materials.

Train students with required transferable skills such as problem solving and scientific skills, digital skills, communication skills, autonomy and leadership skills.

Sustain and innovate a learning community that serves as a hub for learning communities in biodiversity-related fields.

Commercial value

The results/findings of the data collection is publishable and the e-modules can be copyrighted. The e-modules can be utilized by members of the learning community or consortium.

Acknowledgement

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INTERACTIVE RUBRIC GRADING SYSTEM FOR INSTRUCTORS AND STUDENTS (IRIS)

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Highlights: Interactive Rubric Grading System for Instructors and Students (IRIS) is an application developed to address the issue with the project goal to help assess and grade student performance in assignments transparently and effectively by providing tools to facilitate rubric design, monitoring student performance in the online interactive classroom environment. The proposed IRIS application is a hybrid and mobile application that provides features including automatic calculation of assignment score, display statistical dashboard based on classroom or student performance and generate reports based on the student's performance.

Key words: interactive, rubric, grade, instructors, students, education

Introduction

In recent years, biases and consistency during gradings are educational issues which have arisen drastically nowadays (Mustapha et al., 2016). Grading rubrics have been widely used in many institutions of higher education to measure learning outcomes due to its performance-based assessments characteristic as a solution to solve grading biases and consistency issues.

Despite the benefits it brings, traditional grading rubrics become less convenient to instructors in current online educational settings. With traditional-based grading rubric, instructors are forced to manually calculate each score of students' assignments based on the grading rubric which is extremely time consuming (Hudha et al., 2018). To address this issue, an online rubric system is necessary to provide a transparent grading platform for both instructors and students with addition of automatic score calculation to save instructors' time instead of manual calculation of score by themselves.

Hence, Interactive Rubric Grading System for Instructors and Students (IRIS) is an application developed to address the issue with the project goal to help assess and grade student performance in assignments transparently and effectively by providing tools to facilitate rubric design, monitoring student performance in the online interactive classroom environment. The proposed IRIS application is a hybrid and mobile application that provides features including automatic

calculation of assignment score, display statistical dashboard based on classroom or student performance and generate reports based on the student's performance.

It is hoped that the developed IRIS is able to increase the instructors' efficiency and effectiveness to prepare a grading rubric for class assignment in an organized and structured way with the help of rubric templates and also integrate the rubric in the grading assignments process. Furthermore, monitoring the performance of students on the class assignment can act as a direct indicator of the result of teaching delivery and weakness of students. In overall, IRIS application is expected to improve the students' academic performance with the help of clarified rubric and the feedback commented by instructors.

Product development

IRIS is developed according to the following objectives:

(a)   To elicit specific requirements for the Interactive Rubric Grading System for Instructors and Students.

(b)   To design the related architectural models, database and user interfaces for the Interactive Rubric Grading System for Instructors and Students.

(c)   To develop Interactive Rubric Grading System for Instructors and Students based on elicited requirements and designed models.

(d)   To test the Interactive Rubric Grading System for Instructors and Students using suitable testing techniques.

By referring to the Figure 1 which showing the architecture design of the system, the product is developed with React JS framework served as client-side frontend. While on the server side, Microsoft SQL Server taken role as DBMS and the query management is handled by GraphQL in the nodeJS environment.

Key Benefit
Increase the efficiency and effectiveness to prepare a grading rubric for class assignment in an organized and structural way with the help of grading rubric templates.
Reduce biases in grading assignments process.
Monitor the performance of students on the class assignment which acts as a direct indicator of the result of teaching delivery and weakness of students.
Promote bi-directional feedback communication between instructors and students to increase understanding on certain knowledge.
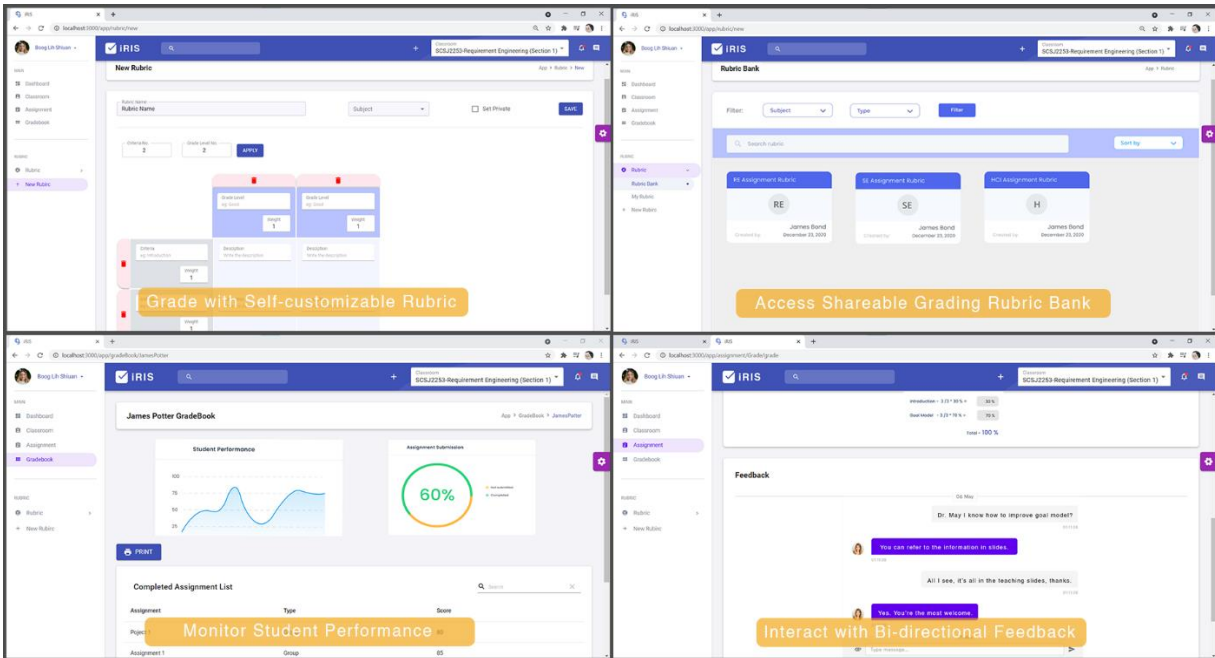
Figure 1 Important Features in IRIS System

Advantages to Education and Community

In overall, this Interactive Rubric Grading System for Instructors and Students (IRIS) is hoped to improve the students' academic performance with the help of clarified rubric and the feedback commented by instructors.

Commercial values

The commercial values of IRIS are based on its flexibility to adapt to any educational standard such as from primary school until university standard. As an automated grading system with the implementation of scoring rubric, its usage tremendously overcome the shortage of existing traditional grading method.

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AUGMENTED REALITY BOOK ON HISTORICAL PLACES IN KUALA LUMPUR

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Highlights: Augmented Reality book to help Malaysia tourism and also used for schools

Key words: Augmented Reality*,* Learning, History, Tourism

Introduction

In this era, the majority of us has a smartphone with a lot of technology implemented for the users to conduct their daily life tasks. We cannot deny that technology and innovation have turned out to be installed in instruction and the outcomes show a positive effect on learning and educating methods. The inventive types of educating and learning are more likely to happen with lessons that are supported by technology Sundeen, D. M. (2013). The reason behind this is due to the use of technology in involving real-world problems, the latest informational resources, and communication with professionals related in the field.

The use of Technology in a school's curriculum has transitioned from not only being a subject in school but to becoming a part of a teacher's method of teaching Pierson, M. E. (2001). Due to this, teachers must spend extra time to learn and understand how to use a computer or future hardware. With this, comes a need for a high level of innovation and confidence when using technology that is a part of contemporary education. Furthermore, with the assimilation of technology into a school's curriculum, this will improve and make enjoyable a student's learning experience by making it more engaging as well. Therefore, efforts to better understand the application of technology in education from the perspective of students have begun with the use of multimedia, computer-based simulations, animations and statistical software (Neumann et al., 2011). Research performed by Geer and Sweeny (2012) shows that with the use of multiple platforms of media applications, an increased understanding of concepts has shown greater support from students.

Augmented Reality (AR) is a new technology that involves the overlay of computer graphics in the real world as it does not suppress the perception of the physical world compared to Virtual Reality. Augmented Reality has been widely used in different sectors and field which included the application of this technology in education. Although AR is relatively new, the effectiveness of this technology has contributed to the growth of studies on AR. AR has been implemented in education through different fields, for example, it is able to represent a model that requires visualisation more efficiently (Singhal et al., 2012).

Content

Children at various ages have a different type of learning styles during their level of growing up. At an early stage of growing up in between the age of 7 to 10 years old, they tend to pick up and learn mostly by playing and imitations.

Playing is an essential impact of children's growing process and one of the ways is by playing games to initiate a fun way for the learning process of concepts and living skills. However, most of the games and toys are not focused on the educational element and only fun. The challenges in the recent years of child education are to get them to stay motivated and be involved in learning especially when it comes to learning on Historical Buildings and Places. Malaysia government has launched a few campaigns to encourage tourists and locals especially the younger generation to visit historical buildings and places, yet they are still not able to attract them to visit those places. Tourism Malaysia used a different type of marketing tools both traditional and digital method for example, brochure, flyers, and social media page, video advertisement and radio announcement as a method in promoting the campaigns. However, this type of marketing tools is not effective enough to attract the younger generation. One of the reason that these tools are no longer effective is the overuse of words or information in a brochure or flyers. These two tool are widely used to spread information on a subject but still fails reasons to contents are overflow or long explanation of information also an insufficient amount of graphics such as pictures to attract them in visiting and explore Malaysia's Historical Buildings and Places.

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THE METABOLIC TOWN

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Highlights: This study elucidates how an illustration could improve the learning process. The main issue that ignites this initiative is the learners' difficulty in understanding the relationship among three metabolic pathway topic(s). 'The metabolic town' illustration depicts three metabolic pathways (glycolysis, Krebs cycle, and electron transport chain), which highlight the connection among these three metabolic pathways. Nearly 100% of the learners agreed thus establish the connection between the lecture notes and the illustration. As a result, 86.2% of learners strongly agreed that the illustration boosted their understanding and boost their imagination.

Key words: Illustration, Learning, Pathways, Interest, Biochemistry, Understanding

Introduction

Most topics in Biochemistry are complex for learners to learn, especially the mechanisms and metabolic pathways in metabolism topics. Since notes normally wordy in a form of papers/textbooks, learners usually learn and revise by reading texts. As visual explanations can visibly display mechanisms and processes of the metabolic pathway system, creating an illustration could favour teaching and learning process.

For current learners, visual representations are crucial. Visualization is a process of making an object, an event, or a situation visible to one's imagination by mentally constructing or recalling an image. It helps the learners to draw on their past knowledge and be innovative in expanding their thought. Educators can also use a variety of visual stimuli (e.g. illustrations, photographs, reproductions, videos, real objects, graphics) to assist learners in generating ideas for different kinds of work in all kinds of sciences and arts. Embedding illustration in learning encourages visual learners and creative thinkers to take a new perspective on science learning and high-quality illustrations can become science resources (Sevarkadiyon and Parimalafathima, 2019). In this current study, the imagery of biochemistry presented in the classroom and fun learning environments can convey fundamental ideas about science, thereby allowing learners to construct a deeper understanding of a particular topic.

Youths especially are naturally attracted to illustrations than adult learners (Arts Council England). A study by Carney and Levin (2002) discovered that at adjunct transformational (mnemonic) images as helpful tools for learners to learn from the text (McCormick and Levin, 1987). Several outlines that suggested by Carney and Levin (2002) can be considered for the teaching and learning

process, which include:

Learning advantages arise when photos and text include fun or positive information. Decorative illustrations can help make the text/content more appealing, but they are unlikely to achieve the desired results in terms of understanding, remembering, or applying text content.
Easy-to-follow texts that are highly concrete and engaging (e.g. interesting narrative passages) quickly synthesize visual imagery in learners. However, they are unlikely to give additional cognitive benefits from the use of images.

To optimize the advantages of pictures, guide learners to do something with a picture that generates a controllable object, such as marking the features of the illustration (Peeck, 1993) or structuring the process so that learners are confident to create a true visual representation of the passage (e.g. Rubman and Waters, 2000).

The imagination idea of The Metabolic Town was generated from the "Where's Waldo" cartoon/book series. The story and illustration depict dozens of communities doing a variety of amusing things at a given location. Hence, it is an analogy to a human body, which is made up of thousands of cells and associated molecules that carry out amazing and incredible functions at certain locations.

By implementing 'the metabolic town' illustration in teaching and learning, it could boost learner's emotions, understanding, interest and motivation towards these metabolic pathway topics. The illustration could also act as a supplementary tool that could help the educator/teacher to establish, explain, and correlate theory conceptions, and better understandings to make learning more genuine, meaningful, motivating, inviting, and fruitful.

Advantages

- Using illustration as a supplementary teaching tool stimulates interest and improves learning experience in a classroom.
- Illustration substitutes dull learning ambiances.
- Learners develop better and increased understanding of a lesson when they have pleasant learning experience in the classroom.
- Learners find illustration useful when it has some direct relation and use ideal analogy relevant to the course content.
- The present research gave insights on learners' perceptions and opinions on the use of illustration resources.

Idea of Innovation

The imagination idea comes from "Where's Waldo" cartoon series, whereby dozens of people doing a variety of amusing things at a given location.
Hence, the analogy from there,
Analogy: Like our cells/molecules that perform many amazing functions in metabolic pathways at different organelle/location 'appointed'.

Commercial Potentialities

The illustration can be expanded & compiled for Biochemistry illustrative book publication or modules publication.

Sustainability
Cost-effective.
Printable always & can be kept as e-copy.

Acknowledgement

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ASSESLY: STUDENT ASSESSMENT ANALYSIS USING MACHINE LEARNING

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Highlights: This innovation introduces a novel solution to teachers and educators in planning the educational works for each student. As time is precious, and teaching, including planning for teaching materials, is a tiring process, an optimized method is needed in order to plan the best teaching materials and classes for the right group of students. Furthermore, by leveraging technology in data science and data analytics, this innovation helps educators in identifying students with the potential to be struggling in their studies so that early help can be planned and given, including monitoring the performance of the students time to time.

Key words: *Assessment, data analysis, machine learning, classification, academics, strategic education*

Introduction

Education is a stepping stone for a successful career in the future. Students are taught multiple subjects in school as part of their curriculum managed by the education ministry, or any other related departments. A brighter future becomes available for students when educational implementation is successful (Retnawati et al., 2018). However, when the lesson and teaching plans are poorly managed or planned, this can invoke a drop in the quality of education received by the students. Lesson planning is a major key in the delivery of education in a sense that the teachers must decide in order to arrange the optimized learning experience for students (Straessle, 2014). The quality of education in schools improved with the aid of strategic planning through knowledge management. According to (Yapandi, 2018), quality of education represents the processes and outcomes of education, being the base to achieve the requirements and expectations of stakeholders in creating or improving products in education management. With knowledge management, the strategic planning capacity, competencies of teaching and learning assessments can be refined (Cheng, 2013). By implementing strategic education planning, we can allow teachers, educators, and those in charge with education plans the opportunity to act dynamically to the future, technology, and the environment as one (Yaakob et al, 2019). When planned education is given to students, the quality of learning is sure to improve. In order to do this, a proper planning of teaching lessons and strategies must be implemented so that the best education is provided to the students. To improve teachers' management skills and implementation of innovative teaching, supporting media can be developed in order to help teachers in this matter (Retnawati et al., 2018).

Our solution to this problem is exhibited in our innovation, ASSESLY. Our innovation will assist teachers in grouping the students by academic performance, and provide an insight on subject topics that most students are currently struggling with. These features are made possible with the help of data analysis and unsupervised machine learning. By grouping students according to their academic performance groups, teachers can identify which students would need more academic support and plan special classes for them. This does not mean that only the struggling students receive teachers' attention, but the other groups can also undergo their own academic activities planned by the teachers. For instance, the top students can take turns being mentors to the whole class or batch, and the middle students can demonstrate the summary of a topic in front of the teachers and their own group. On the other hand, analysing subject topics based on the students' assessment can give a hint to the teachers on what topics most of them are weak in. With this information at hand, teachers can plan learning modules and classes focusing on the topics brought up by our system, ASSESSLY. Hence, the students receive balanced academic support for the whole subject.

Description of innovation

Our innovation, ASSESSLY comprises 2 features that will assist teachers or those in the education sector. The first feature is that ASSESSLY will group students based on their academic performance, namely students at the top of the grade, the middle students, and the struggling ones. It is achieved by utilising their assessment data, which includes examination marks, coursework marks and their class attendance. Clustering is performed on this dataset to obtain the formed academic groups. Teachers will upload the students' assessment dataset for analysis by the system and the outcome is displayed, portraying which students fall under which academic groups.

The second feature of ASSESSLY is that it will provide an insight on subject topics that require extra focus from the teacher to the students.Taking the marks per question on a subject exam, ASSESSLY will analyse the given data and determine which topics of a subject that require extra tutoring. Taking into consideration that teachers set up exam questions by partitioning a number of the questions for one topic, they will key in the marks per each question into ASSESSLY. Consequently, the subject teachers will be able to know what topics that the students are struggling with in the subject.

Background of the innovation

Assessment data is a popular data source used by teachers to assess whether or not their students have grasped the knowledge they have studied. These can be done by having tests, quizzes and also final exams. Teachers will use the results of these tests to adjust their teaching strategies for upcoming classes. This may involve going over material they struggled with again especially about the topics they're having trouble with. However, this process is time consuming since the teachers will spend time to grade the assessments and analyse the student performance. Furthermore, A study by (Retnawati et al., 2018) also shows that not all teachers are able to distinguish HOTS as an ability, skill, learning strategy, learning method, or learning process. Therefore, when teachers do not have the knowledge necessary to analyse the test scores, this can lead to a very poor decision making (Decker and Bolt, 2008). As a result, this will cause weak

students to drop out of lessons and be overlooked due to the misinterpretation of student results.

To overcome this, data analysis and unsupervised machine learning can be leveraged to assist teachers to assess the students. Furthermore, machine learning tools also can be used to classify weak students directly by evaluating the available data about those students. Therefore, it will help the teachers or educators to make more effective evidence based decision making (Klašnja-Milićević, Ivanović and Budimac, 2016). Apart from that, it can also improve learners' knowledge through enhanced academic studying (Klašnja-Milićević, Ivanović and Budimac, 2016).

Importance of innovation towards education

The importance of innovation towards education is it will introduce new, more efficient and effective ways of analyzing student achievement. This is because we already know that when teachers use conventional methods in assessing student achievement, it is time consuming and complicated because it needs to be done manually. So, with this innovation, ASSESLY, we can put the education system in our country one step ahead by utilizing data analysis and machine learning into our education system.

By using ASSESLY, teachers can assess student performance and identify topics that need to be given more emphasis and initial steps can be taken to help students to master the topic such as holding targeted intensive classes. In addition, by using ASESSLY, weak students can be identified more easily and automatically because ASSESLY uses a machine learning algorithm. With this, the teacher will be able to have a clearer enlightenment by using student data assessment and be able to produce insights and ideas from the data. This is because, ASSESLY will help teachers to visualize data and show data patterns of student achievement from time to time. Not only that, ASSESLY can also classify students automatically into their respective academic level groups. With this insight, teachers can formulate a direction and plan for teaching especially in identifying which topics should be emphasized in a subject and which students should be given special attention. Therefore, this can indirectly improve the quality of our country's education system and provide a more effective and comprehensive education.

Advantages of innovation towards education and community

From the aspect of education, this innovation can certainly save teachers time to assess their students and identify weak students one by one. This is because by utilizing this innovation, everything will be processed automatically with the help of data analysis and machine learning where it is able to give results quickly and accurately based on given data. With this, it can help teachers to make decisions in the learning process whether to provide teaching materials or identify weak students so that these students can be given more focus to help them succeed in the subject.

By improving the education sector, this indirectly impacts the community. This is because when teachers are able to plan their lessons well, especially identifying and helping weak students, students will benefit as they will enjoy and interest in learning because no one is left behind. In addition, these students are young people who will inherit the features of the country's

government and become an asset in developing the country. So, by making the education process more efficient and effective, knowledgeable and intellectual students can be born and subsequently form a successful nation.

Commercial Values

We plan to focus this innovation towards providing it as a service to our target users. This is because by providing services, we can always continue to develop and improve our innovations based on customer feedback. Hence, we can provide the best service suited to their requirements and prioritize the best interests of our user base. For example, we can customise the dashboard or develop additional feature analysis at the request of the user. In addition, our team can offer services to help consumers to utilise the innovation, especially in analyzing data. For example, we can provide the training to use the innovation.

This innovation targets primary and secondary schools especially teachers as consumers. This is because we believe the features developed in this innovation can help the school in maintaining student performance. Therefore, we are committed to collaborate with Ministry of Education (MOE) to implement this innovation. Besides, Senior Education Minister Datuk Dr Radzi Jidin also stated that UPSR is abolished started from 2021 and the assessment method for Year Six students will be focused on strengthening School-Based Assessment (PBS) starting this year. With that statement, it reinforces the importance of ASSESLY as a key tool to help teachers to make analysis of assessments made more accurate.

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MyTLAssist©: A ONE-PAGE TEACHING AND LEARNING GUIDE FOR EDUCATORS

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Highlights: MyTLAssist© highlights the collection of various digital educational tools that can be applied in teaching and learning (T&L) activities online and remotely in one page. This is made possible by using two immersive technologies namely the Quick Response (QR) and Augmented Reality (AR). All the educators required is just one trigger page that can be transformed into an interactive guide. MyTLAssist© is meant as a guide for the educators to identify and choose the best T&L tool for their course amidst the pandemic COVID-19 situations. The guide showcased tools in the categories of Assessment Methods to be used in formative and summative assessments; Screen Recording and Whiteboards to create online content, giving digital feedback and collaborative works; Presentation Software to convey information about course as well as engage students during lectures; and, Live Interaction as an alternative to physical or face-to-face lecture. Video tutorials and tips for choosing the best tool were also incorporated.

Key words: Online educational tools, Augmented Reality, educator's guide.

Introduction

The COVID-19 pandemic has demanded education institutions to shift their traditional teaching style fully online and become a challenge to both students and educators. The educators might be feeling overwhelmed, suddenly facing with the task of learning how to teach classes online, and what more without any training or support. In addition, hundreds of educational tools suddenly sprung out like mushrooms after the rain in the internet, leaving the educators anxious and stressed, did not know what to do. Moreover, since the world has no way of knowing how long this "new norm" will last and bearing these in mind, all the educational tools that can be applied by the educators online and remotely have been put together in a one-page guide.

The creation of this guide is made possible by the application of two immersive technologies, Quick Response (QR) and Augmented Reality (AR). Both these technologies have been widely used in education all over the world. In fact, AR has gained its popularity over Virtual Reality (VR) with its cost-friendly option while still providing many similar features and benefits (Khan et al., 2019; Kumar, 2020). AR encourages interactivity and engagement with the "real world" while minimizes time spent learning the new technology. Furthermore, the AR technology has been further developed, incorporating new features including the grab-and-go technology (Zappar Ltd., 2021). Thus, due to these reasons, we created the one-page guide using the QR and AR technologies. For this guide, we use the ZappAR app (Zappar Ltd., 2021) to develop AR content.

Content

MyTLAssist© (Figure 1) is a one-page guide for educators that incorporates a variety of educational tools that can be applied in their teaching and learning activities during online and remote learning. This guide uses the QR code and Augmented Reality (i.e. using ZappAR app) technologies to assemble all the education tools into one page. The guide is divided into 5 categories which are the Learning Management System, Assessment Methods, Screen Recording and Whiteboards, Presentation Software and Live Interactions. Examples of tools showcased are Kahoot, Quizalize and Kaizena under the Assessment Methods; Screencast-O-Matic, APowerSoft, Jamboard and Whiteboard.chat under the Screen Recording and Whiteboards; Genially, Powtoon and Seek under the Presentation Software; and, FlipGrid, Slido, Cisco Webex and WizIQ under the Live Interactions. The tools showcased in the guide are easy and simple to be implemented in an online class and have been proven effective (i.e. based on the experiences by the developers and educational innovation awards obtained).
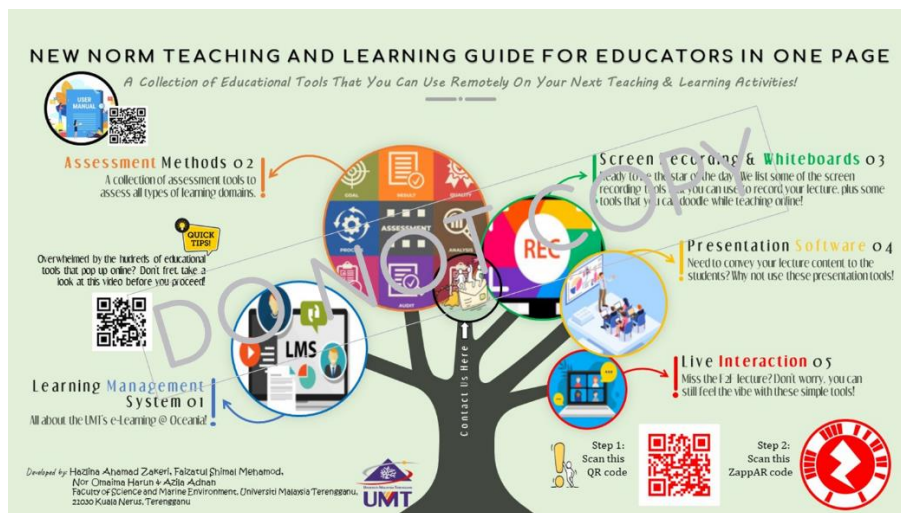
Fig. 1: MyTLAssist© trigger page

In order to access the content of MyTLAssist©, no AR app downloading is needed. MyTLAssist© can be printed in colour or black and white as a mini-poster that can be mounted on walls for easy access. This guide contains info on the educational tools in the form of URL link, tutorial videos (i.e. YouTube), e-mail, Google Forms and audio. In addition, tips on choosing the right tools and user manual are also incorporated. ZappAR app uses grab-and-go technology where the content jumps up onto the device screen when the target leaves the camera view rather than just fading out. This will enable the user to point away from the trigger for ease of use. Furthermore, ZappAR allows us to update the content with more recent tools and information anytime.

MyTLAssist© has gained positive feedback from a group of UMT lecturers in which 100% of them were satisfied with the content and agreed that the tools showcased are very useful for their work. 50% of them were very likely to apply at least one of the tools showcased in the guide while 85% of them said that the way the tools were showcased within the guide is very informative. As it is, MyTLAssist© is 100% ready and available to be used. It has the potential to be commercialized for all educators, university lecturers as well as school teachers. MyTLAssist© can also be customized to the needs and requirements of individual educators.

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AYUH SOLAT DI MASJID AL AQSA

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Content

 The ASMA application is highlited the concept of Educate & Entertain which is suitable to attract the kids. This application provided three language: Malay, Arabic and English, with three levels of game. Player has two selection to play as: Boy (Ubaidah) or Girl (Umamah and needs to pass the mission of each level. Player starts a journey from home to al-Aqsa Mosque for prayers. Besides, the elements of In-Game Education are:

Start the journey with Bismillahirrahmanirrahim
To overcome barriers: say Bismillahirrahmanirrahim,Allahu Akbar, La ilaha illa Allah
Greet when meeting others while walking to al Aqsa Mosque
Listen to the greeting audio
Listen to the audio subhanallah
Need to answer quizzes related to Al-Aqsa Mosque and Baitul Maqdis to pass certain levels
Find Quranic verses and hadiths to add 'energy'
The picture of Al-Aqsa Mosque will appear at the end of level 3

While the elements of in-Game entertainment are:

Need to collect 100 coins on each level
There is encouragement with CONGRATULATIONS every time you complete 1 level
There are obstacles to overcome to complete each level:
    Cactus, traps, rocks, chunks, Zionist soldiers
Throughout the game accompanied by a background song: al-Quds Lana (al-Quds is Ours)

The ASMA Game Link in Playstore

https://play.google.com/store/apps/details?id=com.cynerve.ayuhalaqsa

Key words: Animation Game, Islamic Game, al-Aqsa Mosque, Islamic Jerusalem, Baitul Maqdis, ASMA

Introduction

Animation is an educational methodology through entertainment that is close to children
Islamic -style animated games are still lacking. Therefore, this method should be highlighted to educate children because this group is easier to receive messages through the method. The issue of Al-Aqsa Mosque and Islamic Jerusalem received a warm response among adults. Although it has been colonized for more than 100 years starting from the British occupation in 1917 to 1948 and the Israeli Zionist occupation from 1948 to the present, the Palestinians remain the focus the world, including Malaysia and on the basis of solidarity, Muslims continue to help Palestinians

defend the al-Aqsa Mosque and Islamic Jerusalem from being seized by Israeli Zionists. Nevertheless, the priority of Masjid al Aqsa as the third major mosque in Islam and also the importance of Jerusalem in the history of Islam is not given exposure to children. Unlike the Haram Mosque and the Prophet's Mosque which are better known, there are even some parents who also bring their children to perform umrah or hajj at a young age. There are a total of 2,972,391 android applications as of 14.5.2021. This amount proves that the use of android apps has become a phenomenon in society. However, until 14.5.2021 there is only one (1) animated game related to Al-Aqsa Mosque, namely Aqsa Protector which was uploaded on Google Play Stat by Burj Alluqluq in 2019 and until 2021 has been uploaded over 100,000 times using English as language introduction. Based on these, the researcher chose to develop an android application of an animated game called 'Ayuh Solat di Masjid al-Aqsa (ASMA)', aimed at providing basic and accurate information related to Masjid al-Aqsa and Baitul Maqdis to children. In addition to cultivating a sense of love for the third important mosque and first qibla to Muslims. The existence of the ASMA animated game application is expected to fill the gaps in the latest Islamic medium of children's learning related to Al-Aqsa Mosque and Islamic Jerusalem (Baitul Maqdis).

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SMART IQRA'2: MOBILE APPLICATION FOR LEARNING AL-QURAN USING GAMIFICATION APPROACH

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Highlights: Al-Quran education is a must to every Muslims. Iqra' is one of the effective techniques to improve learning of Al-Quran. With the advancement in mobile technology, learning Al-Quran can be more entertaining, interesting and engaging. To date, there are many mobile applications are available to assist the learning process but least are built with interactive activities. Therefore, this research aims to design and develop an android-based mobile application to assist children in Al-Quran education using a gamification approach. The proposed application is focused on Iqra'2. It comprises of learning module and activity module to support the learning process. The application is expected to provide the alternative method to learn Al-Quran conveniently and interactively. By using heuristics evaluation approach, the results showed that all the experts satisfy with the interface design of the application.

Key words: *gamification, android-based mobile application, heuristic evaluation, Iqra'.*

Introduction

The advancement of technologies conveys a challenge upon constructing an effective and efficient learning approaches. The gamification of learning is one of the educational approaches to improve learning environments. Gamifications refer to the use of game elements such as mechanics, aesthetics, and game-thinking in non-game contexts to motivate action, enhance learning, and to solve problem (Patrick et al., 2016; Sebastian et al., 2011). There has been a growing interest in applying gamification to education as it provides an alternative way to motivate students during the learning process (Karl, 2012). The advantages of gamification approach researchers in the fields of education also have been investigated by the researchers (Simone et al., 2014).

Currently, there are various methods in teaching and learning Al-Quran such as Talaqqi, Musyafahah, Iqra' and Al-Baghdadi. However, Iqra' is known as an effective technique to improve learning of Al-Quran. There are many researches that has been done on the technology used in teaching and learning Al-Quran. To date, there are many mobile applications are available to assist the learning process but least are built with interactive activities. Alternatively, gamification technology can be implemented to improve Al-Quran teaching and learning process. Therefore, this research aims to design and develop an android-based mobile application that incorporated gamification elements in Al-Quran teaching and learning, called Smart Iqra'. The objectives of the research are to provide a mobile application to learn Hijaiyah through gamification, enhance learning environment through interactive multimedia elements and embed

user control and interactivity. Specifically, the application is focused on Iqra'2. It contains both learning and activities materials. In order to improve the quality of interface design, a heuristic evaluation also has been done with experts.

The inventiveness of this innovation is it provide self-paced learning, interactive multimedia, gamification elements, and provide user control and interactivity. Besides, the application has potential to commercialize especially to education sector (primary school), government agency (JAKIM) as well as to individuals (parents, teacher).

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HIGH QUALITY RECORDED VIDEO FOR THE EFFECTIVE INVERTED CLASSROOM APPLICATION

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Highlights: Recorded video is the main component of flipped classroom where it is independently used by the students to get introduced and adapted with the designated knowledge before applying them to solve the problems in the classroom. In this project, several technical issues with respect to the video recording process have been addressed through the development of a recording studio at FTKKP, UMP. This facility is equipped with the necessary tools to boost the audio and the video presentation quality. The common drawbacks of the prepared video, such as poor audio quality, lack of volume controllability and low-resolution videos, have been tackled via the efficient application of high-end recording studio with the assistance of video editing software, Filmora.

Key words: *flipped classroom; recording studio; audio quality; Filmora.*

Introduction

The lockdown due to the COVID-19 outbreak has taken the world by storm. This situation has left the academia optionless but implementing virtual classes. Offering a safer environment and non-physical contact platform, online teaching and learning serves as an alternative to replace the conventional classroom setup which employs fully face-to-face meeting. In this awareness, a great approach to address this issue is through the implementation of flipped classrooms where the students would have the ability to flexibly access the provided resources such as recorded videos, online modules and interactive tutorials, and come back to the class with background knowledge (Zainol & Abu Samah, 2018).

As one of the main components of flipped classroom, the recorded lectures act as the main transmission medium of information delivery, contributing 79% to the total implementation of flipped classroom (Akçayır & Akçayır, 2018). Most of the students prefer the streaming content as an out-of-class activity (Smith, 2013), rather than text readings (Bishop & Verleger, 2013). Another advantage of using video lectures is that the students would have the opportunity to leverage on the application of pause, rewind and fast-forward functions (Bishop & Verleger, 2013). Nevertheless, Attaran & Zainuddin (2015) highlighted the importance of employing high quality out-of-class tools/materials to increase the effectiveness of the flipped model. The high-quality presentation helps with the students focus and attract their interest to spend adequate screened time.

Content

In this work, a proactive initiative has been undertaken by the Faculty of Chemical and Process Engineering
Technology at Universiti Malaysia Pahang to provide a recording facility which enables the instructors to prepare a high-quality pre-recorded video (Figure 1).

Figure 1: Recording Studio at FTKKP, UMP

Recording studio has been developed to provide the instructors with a complete recording amenity which consists of a computer as the main recording tool, overhead screen as a script display, green screen to facilitate the high-quality overlay image and sound-proof walls to cater for the efficient acoustic. The studio is also equipped with a 1080p full HD webcam which gives a high-resolution video and combined with the external mic to boost the audio quality. The development of this recording facility stems from the feedback of the students who experienced some difficulties to catch up with the previous delivery method. Among the key points of the feedback are poor visual quality, low volume controllability and unattractive lecture presentation. This can be explained from the lack of experience among educators and poor skill in the video preparation. These technical and technological issues were also highlighted by Moraros et al. (2015) who found that poor audio quality was one of the three limiting factors experienced by the students in a flipped classroom. As a result, the students faced the difficulty to listen attentively to the instructors, worsened by the background noise which distracts the students' focus on the lessons conveyed by the instructors.

After implementing this new approach since the beginning of Semester II of 2020/2021, the feedback from the students have been encouraging and they indicate a certain degree of acknowledgement by the extended efforts of the instructors. The preparation, even though demanding an extra time and energy from the instructors, provides high quality education and stimulates the students' interest to also produce high quality work via this blended learning environment. In addition, the recorded videos can be used for the same purpose in the future where the instructors may not need to produce the same materials of the course. In this project, flipped classroom has been selected as an example of the application of recorded video but the studio definitely offers the opportunity to prepare all related academic materials. In the case when the country announces a full movement control order (MCO) which limits the students' movement to the class, the instructors may use this opportunity to conduct the live streaming lecture using the same platform for the discussion and problem-solving session, and/or prepare the recorded videos accordingly.

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AniMe-Cs: AN ANIMATED MEDIA TASK FOR 21ST CENTURY LEARNING

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Highlights: AniMe-Cs is a spin-off from Interactive Cognitive Exploration via Task-Based Learning or ICE@TBL model (Darmi, 2018). It extends the model by highlighting the higher-order thinking (Bloom's Revised Taxonomy) which focuses on tasks that require students to create or develop an end-product. AniMe-Cs is in line with the 21st century learning and the 4th Industrial Revolution as it places special emphasis on critical, creative thinking, collaboration and communication skills (4Cs), and conflates peeragogy, heutagogy and cybergogy which advocate student- centredness bound by technology. This trains the students to embrace life-long learning and be autonomous, flexible and able to personalise learning.

Key words: 21st century learning, higher-order thinking, peeragogy, heutagogy, cybergogy

Introduction

With the advent of web 2.0 tools, pedagogy has become more compelling. Instead of the conventional one- way communication where the spotlight is on the teacher spoon-feeding knowledge to the students, it has been redirected to focus on the students instead. Anime-Cs is a task-based pedagogy which capitalises on web 2.0 tools where students complete the task given by utilising the related tools. Thus, the students are required to make decisions on what content to embed into the tool assigned to them and how it is to be used based on the specific task assigned. These are done with technology as the enabler. This write-up presents the insights of AniMe-Cs in terms of its development, background context, importance to education, advantages and commercial values.

The innovation: AniMe-Cs

One of the ways for educators to support technology-oriented tasks is through task-based pedagogy as it considers learners' personal experiences and the authenticity of the classroom teaching (Samuda & Bygate, 2008) where tasks are focused on meaning, interaction and communication. Anime-Cs was designed as a teaching approach to cater to the needs of the 21st century, where students were able to explore the 4Cs (creativity, critical thinking, communication and collaboration). It is an extension of a task from the Interactive Cognitive Exploration via Task-Based Learning or ICE@TBL model, proposed by Darmi et al. (2018). The model is used to explore the cognitive variations that one task has upon learners. The feature of Anime-Cs is supporting higher-order thinking skills to learners, specifically at the 'creation' level of Bloom's taxonomy.

Designing AniMe-Cs

AniMe-Cs was used in the course 'Technology and Innovation in Education' in the Education Postgraduate Diploma programme in Universiti Sains Islam Malaysia (USIM). It aimed to train students to prepare for attractive online (synchronous or asynchronous) lessons, during the covid pandemic era. As one of the tasks in the course, students were required to create a short animated video for a set-induction phase of a lesson. Prior to the task, the instructor exposed and guided students to Plotagon, a free online platform to create animated videos and characters by using a script style layout. In the actual task, a list of other animated media platforms (Animatron Studio, Animaker, Renderforest, Biteable, Canva, Powtoon, Vimeo Grid, Sparkol, and Prezi) were given to students. Each group was assigned to 1 platform. They were required to identify a topic from the Curriculum and Assessment Standard Documents (**DSKP**) from any level (Forms 1-5).

Importance to education

In keeping up with learning by upholding the features of 4th industrial revolution, 21st century learning skills, and optimising IOT (internet of things), AniMe-Cs embraces the concepts of peeragogy, heutagogy and cybergogy. These concepts are based on student-centredness and are held together by the use of technology. Students work together to create an end-product or complete a task, exposes to self-directed learning, become designers of their own learning through technology use. AniMe-Cs conflates these three (3) concepts together allowing the students to learn collaboratively while completing a task through the use of internet.

Advantages of AniMe-Cs

AniMe-Cs places special emphasis on critical, creative thinking, collaboration and communication skills (4Cs). USIM wanted to explore the potential for integrating these technologies with personalized and customized teaching and learning processes. AniMe-Cs offer this help by promoting:

Student Autonomy: Students can make choices about what they are learning in the class with the intention of boosting their engagement and motivation. This provides positive effect on student motivation as they are methodically encouraged to ask themselves why they have chosen specific learning materials and activities, and how their choices relates to their interests and preferences.

Flexible Learning Environment: Integrating modern technology like web 2.0 tools is another way to enhance flexibility and adaptiveness of the online learning environment. Now students can use these online learning materials at different places in and outside their class at their own pace.

Personal Learning Path: Students can self-assess their individual strengths and weaknesses, or reflect on what they have academically achieved, excelled at, or struggled with in the past. They can choose materials to use in class projects and how competence can be demonstrated. Students must be provided with the process, supports, and technology to support independent goal-setting that can be measured and tracked over time.

The commercial values of AniMe-Cs

Anime-Cs has been implemented since 2019, with 4 cohort as users of the approach. An online structured interview was distributed to 34 students to gather their perceptions on creating

animated media task given to them and its link to 21st century learning (refer to Table 1 for the results of the interview). Students felt that using animated media can attract learners' interest, make teaching and learning more interesting, help understanding, increases learners' performance, ease preparation of content and leaves a strong impact on learners. Students also agreed that animated media task supports 21st century learning as it aligns with the education transformation and use of technology, encourage collaboration, creativity, critical thinking, interactivity and new exploration, increases learners' cognitive level, is contextually-suited to learners' current technology-based environment, learner-centred, and holistic. These show that AniMe-Cs can be implemented to wider users.

Table 1: Students' perception on the use of animated media in relation to 21st century learning.

Statement	Scale					
	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Total
*Developing media animation makes us more creative	1 (2.9%)	0	0	9 (26.5%)	24 (70.6%)	34 (100%)
*Developing media animation makes us more critical in giving opinion	1 (2.9%)	0	0	18 (52.9%)	15 (44.1%)	34 (100%)
*The task to develop media animation trains me to amend the way I communicate in a group.	1 (2.9%)	0	2 (5.9%)	11 (32.4%)	20 (58.8%)	34 (100%)
*The task to develop media animation allows me to collaborate with my group members.	1 (2.9%)	0	2 (5.9%)	16 (47.1%)	15 (44.1%)	34 (100%)

*statements have been translated from Malay to English

With the exposure to AniMe-Cs, some students have taken the initiative to apply the approach into their lessons during the teaching practicum, and given trainings on the use of animated media to school teachers as part of their contribution to the schools. This proves the extensive use and potential collaboration of AniMe-Cs. Sharing of the implementation of AniMe-Cs has been given to USIM Tijarah and Academic International Dialogue (AID), approached by Kuala Pilah Matriculation Centre, and future use at Yayasan Pahang, and other education programmes within USIM and other institutions. Anime-Cs has also received its copyright in 2018 (File no. LY 20180006558).

Conclusion

Using Anime-Cs in teaching and learning has shown positive impacts on students in preparing them for the challenge of 21st century education. By exposing students Anime-Cs, they become more independent in the exploration of the animated media, creative in designing the animated video, critical in planning the content, and communicate and collaborate professionally and ethically with team members.

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RE-DESIGNING THE DESIGN THINKING IMPLEMENTATION IN SOFTWARE ENGINEERING COURSES DURING COVID-19 EMERGENCY REMOTE TEACHING AND LEARNING

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Highlights: This study highlights the re-designing of Design Thinking (DT) approach in integrated project implementation for two collaborative courses namely Software Engineering (SE) and Requirements Engineering and Software Modeling (RESM) during recent crisis of COVID-19 online emergency remote (ER) teaching and learning (TnL).

Key words: Design Thinking; Software Engineering, Requirements Engineering; Software Modeling, Emergency Remote Teaching and Learning.

Introduction

It has been a year since the COVID -19 pandemic hit the world and inevitably, brings disruption to the education sector. In the context of Malaysia Outcome-based Education (OBE) system especially, the shifting from face-to-face interactions in traditional methods to the online emergency and remote (ER) teaching and learning (TnL) environment, obliges the emergent re-adaptation and re-adoption of constructive alignments elements namely the learning outcomes, instructional design activities and the assessment tasks for course delivery during the ongoing and beyond   this   COVID-19   crisis.

This study aims to re-design the online collaborative project implementation for two integrated courses namely Software Engineering (SE) and Requirements Engineering and Software Modeling (RESM) in School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia; current semester 2, 2020/2021 session which is to re-align with Design Thinking (DT) approach adapted based on Software-Engineering (SE) Project-oriented Problem-based Learning (PoPbL) generic framework (Ibrahim & Abd Halim, 2014) (Ibrahim, Abd Halim, Saadon, Ghazali, & Hassan, 2019). Prior to COVID-19 crisis, the collaborative project implementation for these courses has been redesigned in terms of incorporating more collaborative tools to increase the cooperation among online team members. The tools also help in the communication between the lecturer and students for the purpose of scaffolding the students project deliverables. Furthermore, for peer review, team members used tool for rating their members participation in team project. Another redesign is the individual assessment, where each team members will develop their own prototype based on the task which have been assigned to them from team discussion. Rationale for this is to ensure there will be equal effort from team members from the start to solve the problem as well as to reduce the possibility of free riders among team members especially during ER project implementation.

The involvement of actual stakeholder from certain business domain for software development projects is seen as an important exposure for teaching future software engineer in ER environment. Not only that, requirement engineer also must be exposed as mediator between the development team and related clients in the software project. DT is a user-focused approach that provides structured problem-solving solutions towards innovative solutions including products, services, and business models (Hehn, 2019). Thus, an appropriate method as DT that emphasizes empathy with the needs of the client, brainstorming sessions to get ideas, application of ideas into physical prototypes and testing the prototype on the client to fix and correct its shortcomings and deficiencies is seen as a suitable method for face-to-face problem solving as well as for ER environment.

In this study, the five basic process in DT namely: empathize, define, ideate, prototype and test (Interaction Design Foundation, n.d.) are re-designed with the adapted SE-PoPbL framework to achieve the intended learning outcomes with the alignment of conducted TnL activities as well as the given assessment tasks (Refer Figure 1). Additionally, the DT implementation is twofold: (i) technical competencies in the software project development and (ii) strengthen creativity skill - that is critical for software engineer to solve the problem of real-stakeholders in industry-context settings (Hehn & Uebernickel, 2018; Penzenstadler et al., 2018). Similar works by Ferreira Martins et.al (2019) discuss the challenges of DT adaption in requirements elicitation specifically, while (Pham & Fucci, 2018) and (Penzenstadler et al., 2018) share the experiences of embedding DT in teaching Software Engineering courses to address learners in complex problem solving for their targeted real-stakeholder for software projects development.

Figure 1 presents the re-design of DT process alignment with Software Development Life Cycles (SDLC) phase, the conducted ER TnL activities, the integrated deliverables for the SE/RESM courses project and the online collaborative tools being utilized. SE1 until SE4 are basically the planned deliverables that should be assessed for SE course. RE1 until RE4 are the deliverables that should be submitted for RESM course. Empathy and define process in DT are mapped to requirements phase in SDLC. Learners need to communicate, engage, observe, and listen to stakeholder wishes – to familiarize and understand the clients needs. During requirements phase, online stakeholder elicitation and brainstorm workshop sessions are conducted to engage and communicate with the clients. Google Meet is used as a virtual conference meeting tool for the workshop. Second process of DT namely ideate and synthesis are mapped to analysis and design phase in SDLC. It is important for the learners to define the issues and problems faced by the stakeholders before they can propose a suitable solution for the domain or context. At this stage, learners should be able to initially elicit the functional and non-functional requirements based on the identified problems earlier. During analysis phase, learner should be able to produce step-by-step scenario to solve problems. During these phases, frequent discussion is needed among team members, therefore permanent breakout voice and text channels were introduced to each team using Discord platform. With these channels, the team can discuss online during lecture hours or after lecture to further understand the problems together and also to prepare for the deliverable's submission. The scaffolding of their deliverables can be further discussed with the lecturers in the same channels either in the form of text or voice. In design phase, the scenario is transformed into feasible software design structure to support the development of the software. This process is realized by number of activities such as virtual discussion between team members and the stakeholder using Discord platform, in-class problem solving as well as team collaborative discussion using forums in Moodle. Subsequent DT process is prototype which is mapped to SDLC development phase. This phase is basically a process to develop an early working solution

to get user experience of the proposed solution. During this phase, the high-fidelity mock-up prototype is performed by the individual team members. Finally, the last process of DT namely test is mapped with testing activity in the SDLC phase. Both tests are to ensure the developed prototype fulfil the stakeholders' requirements based on the empathy identified earlier. During this stage, the prototype demo and pitching presentation should be conducted to get the feedback from the stakeholder. As a team, students are required to have a cooperative way in solving their problem and show the effectiveness of their project management in a collaborative project management tool, Trello. Continuous feedback from the students were also required to enable an effective TnL during ER, Google Form is the tool to enable a feedback survey after each lecture. Lastly to enable team members to rate their team members, MyPeer is used as a tool for online collaborative peer review.

SDLC PHASE \ DT PROCESS	Requirement	Analysis and Design	Development	Testing
EMPATHIZE AND DEFINE	• Team formation and project case study dissemination • Virtual brainstorming and elicitation workshop • Online team collaborative discussion & progress report • Online team feedback and peer-review rating			
IDEATE AND SYNTHESIS		• Virtual discussion with stakeholder • Online team collaborative discussion & progress report • Online team feedback and peer-review rating		
PROTOTYPE			• High fidelity mock-up prototype development • Online team collaborative discussion & progress report • Online team feedback and peer-review rating	
TEST				• Virtual prototype demo and video presentation to stakeholder • Online team collaborative discussion & progress report • Online team feedback and peer-review rating
INTEGRATED PROJECT DELIVERABLES	i. SE1: Case study proposal ii. RE1: User requirements definition document	i. SE2: Requirement specification and analysis ii. SE3: Software design document iii. RE2: Requirements model document iv. RE3: Software requirements specification (enhanced)	i. RE4: High-fidelity mock-up prototype	i. SE4: Test case document
ONLINE COLLABORATIVE TOOLS	moodle	DISCORD	MyPeer Assessment — I am an INSTRUCTOR / I am a STUDENT	Trello	Google Forms

Figure 1: Alignment of DT process with SDLC phase, ER TnL Activities, Integrated Project Deliverables and Collaborative Tools

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GAME-BASED 3D VIRTUAL LEARNING ENVIRONMENT (3D VLE): AN EFFECTIVE TOOL TO IMPROVE DEAF STUDENTS' ENGLISH VOCABULARY

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Highlights: The current COVID- 19 pandemic has forced many countries to halt the spread of the virus by closing schools, colleges and universities. Educators, parents and students continue to struggle adapting new ways of going out about their lives. With the shift from face-to-face instruction to online education, developing and designing online learning platforms, tools and materials have certainly been a challenge for special education teachers in providing engaging learning experience to their students. In the context of English language learning, the deaf and hard of hearing students at Politeknik Ungku Omar (PUO) need a variety of approaches and support in terms of having appropriate adaptations, modifications and accommodations made to the online instruction and classroom activities. This innovative research aims to evaluate the effectiveness of 3D Virtual Learning Environment (3D VLE) Vocab-Game that is designed not only to improve deaf students' English Vocabulary but to better engage them in fun virtual classroom activities.

Key words: Game-based learning, 3D VLE, English Vocabulary, Deaf students

Introduction

Various studies have shown that deaf or non-hearing students face challenges in reading comprehension mostly because they cannot develop a fluent system of communication required to become proficient readers. This can affect their communication skills, leading to an overall depressed academic achievement and social seclusion (Soogund & Joseph, 2019). Hence, it is understood that vocabulary acquisition and reading ability are mutually dependent. Without rich vocabulary, deaf students may fail to develop reading skills appropriately and as a result of poor reading ability, they may not be able to build rich vocabulary.

With the increasing number of Covid- 19 cases in Malaysia, educational practice for Special Education has been one of the most affected issues at PUO. The absence of one-to-one interaction together with the struggles faced by English instructors in making deaf students participate in online class activities, have led them to come up with effective platforms and tools to ensure students achieve the learning outcomes as well as to engage them in virtual classroom activities. Thus, using CoSpaces Edu AR/VR application, a game-based 3D VLE entitled 'Vocab- Game' was developed for deaf students to enrich their English vocabulary and engage themselves in a fun virtual learning experience.

Findings

At the time of development of this game, academic semester has already ended. However, to investigate the effectiveness of 'Vocab-game' for upcoming semester use, nine English instructors were asked voluntarily to download the application on their mobile device. After a brief instruction presented, they were then asked to play and complete the game. After completion, they were given a questionnaire to evaluate their game-based learning experience. The questionnaire items cover several aspects from game content, layout and interface, visualisation and navigation, instructions and language use as well as engagement and learning experience. From the findings, it can be seen that, 'Vocab-Game' has potential to help deaf students enrich their English vocabulary. It is much needed for English instructors to engage deaf students in a fun learning environment for online class activities in order to ensure they do not lose motivation to learn and are not left behind.

Table 1: English Instructors' Evaluation on 3D VLE 'Vocab-Game'

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Appropriate Content	-	-	-	-	100%
Clear Instructions & Language Use	-	-	-	33.3%	66.7%
Attractive Layout &Interface	-	-	-	22.2%	77.8%
Appropriate Visualisation & User-friendliness	-	-	-	77.8%	22.2%
Effective Engagement & Fun Learning Experience	-	-	-	-	100%
Overall Evaluation	-	-	-	-	100%

Figure 1: User Interface on Mobile Device

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We would like to take this opportunity to applaud and show support to all Special Education students and teachers all around the world who are doing their best to cope with this pandemic crisis.

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E-PORTFOLIO: AN ENGAGEMENT PLATFORM FOR STUDENT'S LONG-LIFE LEARNING

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Highlights: Nowadays, learners grow up with technology dominating most of their life activities. Smartphones and computers are always with them and internet connections are their heart and soul, inseparable. Following this trend, higher education learning had changed from conventional to electronic learning (e-learning), modern and digitalize. Subsequently, an assessment which is part of the education learning system has also evolved to e-assessment and this evolution makes learning activities more exciting and attracts learners to fully engage in a particular course. By practising education system using the digital platform, learner's life-long learning skills are continuously applied. This paper introduces the electronic portfolios (e-portfolios) as a platform to create awareness among students on the nature and importance of lifelong learning skills and active engagement through the online learning system.

Keywords: e-assessment, digital learning, e-portfolio, higher education, lifelong learning.

Introduction

E-portfolio is one of prevailing e-assessment in the recent education system. The approach of e-portfolio is to integrate virtual learning environment of the student include their course-related work, artefacts such as essays, posters, photographs, videos, and artwork that can be uploaded on the digital platform (Laurence & Duhaut, 2009). Digital collection of artefacts in e-portfolio can be revised, revisited and edited constantly and do a reflection on it. With an e-portfolio, the student is fully in charge and could decide, design and create the content as well as chose selected artefacts in their e-portfolio (Penny, 2011). This method is different from the conventional Learning Management System (LMS) which owned and controlled by the instructors.

The e-portfolio
Basically, the e-portfolio is an alternative to the traditional paper-based portfolio. The e-portfolio is a platform to communicate and showcase skills, experience and learning. It contains diverse artefacts and contextualized artefacts with reflections whereby the audience can dynamically review, communicate and assess the e-portfolio created by the students.

The e-portfolio is organized in 4 main sections namely internal resources, external resources, specific project and communication. By completing all sections, students can be assessed on their capability in fulfilling the required rubric provided by the instructors. The e-portfolio was practically used by the students of Natural Resources Science Program, Faculty of Earth Science were using this tools as one of course assessment for ENE3193 (Watershed Management) and ENE3203 (Sustainable Forest Management) in evaluating their life-long learning skills.

Besides as an e-assessment tool, the e-portfolio comes with tremendous advantages not only for students but also to instructors as well as ease the course evaluation management. Among other benefits of using e-portfolio are:
Increase efficiency in term of time, and avoiding wasted journeys to present specific task and creates more time for other important things.
Much easier in uploading various types of artefact from various sources as electronic evidence e.g. images, video or voice recordings from Youtube, FB, websites etc.
A smart working environment where multiple learners can simultaneously work on the same platform and anywhere and anytime needed.
Greater learner involvement where learners do not particularly need to use external sources or recording evidence but can upload their own created video for presentation.
Ease of identifying gaps in skills and knowledge
Reduce the usage of paper and support the National Green Agenda (paper-less)
Good platform to integrate and share data.

By using e-portfolio, student's information management and lifelong learning skills are assessed. From the survey, we found that 93% of respondents agree that during the development of their academic e-portfolio, their computer and information technology (IT) skills, graphic and content design skills were developed correspondingly (Figure 1). Despite the lack of knowledge on e-portfolio before the explanation been done in the lecture, the students had taken full efforts (Figure 2) to learn and find the best content to be uploaded on their e-portfolio. By having an e-portfolio, the student can use the folio to market their self, showing their abilities, knowledge and skills to the public. E-portfolios can help in developing deeper learning which could results in higher grades, help learners develop a better sense of themselves as students and as individuals too. Their e-portfolio can be shared with friends and family members and a great platform to showcase their achievements when they are applying for a job (Mustafa, 2013).
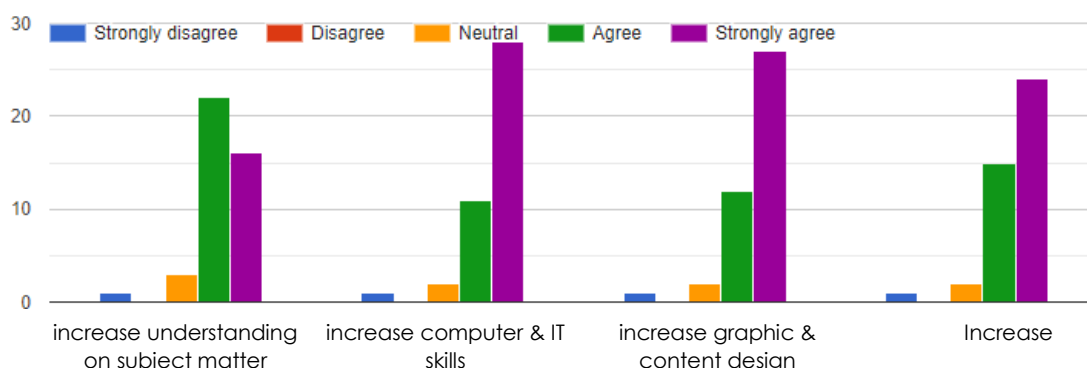
Figure 1: Student's perception of the practicability of using e-portfolio

Figure 2: Level of effort in completing e-portfolio

However, there are several challenges occurred during the application of e-portfolio. Table 1 below show example of challenges faced by students in developing their e-portfolio in this semester.

Challenges in e-portfolio	Percentage (%)
Selection of artefact	29.5
Internet connection	22.5
Time constraints	11.5
Selection of outstanding design	20.0
Quality of writing and proofreading	16.5

Among the top challenges out of five was selection of artefact, however all challenges present as obstacle for many students. Nevertheless, they were working strenuously towards challenges because they not give up but to reflect on what they can do better, make adjustments and persist. It is hoping that surmounting these challenges and obstacles can lead to greater understanding and better results in students performances as many of them need time, guidance and encouragement to be adapted with new ways of learning and assessment, so do the lecturers.

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HAMOODY SMARTPHONE

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Highlights: HAMOODY SMARTPHONE is a language game application that aims to enhance the speaking skills among non-native Arabic learners. It is established based on the audio-lingual method and focuses on the elements of sound and graphic throughout the game. This allows self-learning as it indirectly exposes the learners to the correct grammatical construction of the sentences and precise pronunciation. This is possible because direct method is used where Arabic, the target language is utilised throughout the 30 levels of language games. A study conducted on non-native Arabic speakers shows that HAMOODY SMARTPHONE is highly effective in enhancing Arabic speaking skills.

Key words: TASL, non-native speakers, gamification, speaking skill, autonomous learning.

Description of innovation

HAMOODY SMARTPHONE is developed to enhance the speaking skills among non-native Arabic learners. It is a language game for android-based smartphones. It has elements of

فـواكه	أعضاء	حيوانات	مكان	صفات	مواصلات	أرقام	اتجاهات	أدوات	ألوان	أشكال	طعام
١. جزر	١. رأس	١. فـأر	١. مدينة	١. كبير	١. سيارة	١. واحد	١. فوق	١. قلم	١. أصفر	١. مثلث	١. خبز
٢. مـوز	٢. أذن	٢. قـط	٢. قـرية	٢. صغير	٢. طائرة	٢. اثنان	٢. تحت	٢. ورق	٢. أحمر	٢. مربع	٢. أرز
٣. تفاح	٣. عين	٣. كلب	٣. حديقة	٣. طويل	٣. قطار	٣. ثلاثة	٣. أمام	٣. كتاب	٣. أخضر	٣. مستطيل	٣. معكرونة
٤. برتقال	٤. أنف	٤. أرنب	٤. غابة	٤. قصير	٤. صاروخ	٤. أربعة	٤. خلف	٤. مكتب	٤. أزرق	٤. دائرة	٤. دجاج
٥. عنـب	٥. فـم	٥. بقـر	٥. صحراء	٥. سريع	٥. دراجة	٥. خمسة	٥. بجانب	٥. كرسي	٥. أبيض		٥. بيض
٦. بطيخ	٦. يـد	٦. حصان	٦. جبل	٦. بطيء	٦. سفينة	٦. ستة	٦. بين	٦. حقيبة	٦. أسود		٦. سمك
٧. ليمون	٧. جناح	٧. حمار	٧. جزيرة	٧. بـارد	٧. حافلة	٧. سبعة	٧. داخل	٧. دولاب	٧. برتقالي		٧. لحم
٨. تـمر	٨. صدر	٨. جمـل	٨. بحر	٨. حار	٨. شاحنة	٨. ثمانية	٨. خارج	٨. صندوق			٨. ماء
٩. طماطم	٩. رجـل	٩. قرد/كنغر	٩. نهـر	٩. جديد		٩. تسعة		٩. كرة			٩. عصير
١٠. فلفـل	١٠. ذيـل	١٠. حمام	١٠. سماء	١٠. قلم		١٠. عشرة		١٠. سلة			١٠. حليب

interesting sounds and graphics throughout the 30-levels game by using 107 selected daily words from 12 categories as shown in Figure 1. Players can choose their icons and at the same time practice using those words in completing the game, as well as applying it in their daily life.

Figure 1: 12 categories of daily words

Context or background of the innovation

Language is used to express needs within specific systems and rules. It is to exchange feelings and ideas such as signs, sounds, and communication in life. These implies the importance of speaking skill, which should be emphasized in the teaching and learning of a language. In addition, the era of technology should also be taken into consideration as educational research has shown an upward trend in the use of games to improve learning (Demouy & Kukulska-

Hulme, 2010; Ke, 2009).

The integration of gamification in education aims to create more interesting and effective learning experiences, and to make it acceptable by the new generation through students' continuous, eager, and motivated involvement (Flores, 2015). Gamification is gaining popularity among educators for its positive effects in generating productive and creative students (The NMC-Horizon Report, 2014), enhancing students' knowledge acquisition (Connolly et al., 2012; Li & Tsai, 2013), teaching problem solving skills (Li & Tsai, 2013), and increasing students' affective motivation (Connolly et al., 2012; Dempsey et al., 1994; Hays, 2005; Matsumoto, 2016; Young et al., 2012). Games also contribute to the development of the 21st century skills (Gee, 2008), alongside offering challenges and immediate feedback to students (Gee, 2008; Squire, 2011). This applies to the teaching and learning of most second languages, including the Arabic language.

Previous studies show that non-native Arabic learners outside the Arab countries are deprived of chances to practice Arabic due to the limited real-life encounters of the Arabic environment in the process of teaching and learning (Rohaizaf, 2013; Yaacob & Bakar, 2018). Other problems include the lack of practice outside the classroom, coupled with limited vocabulary and sources, and conventional teaching techniques which are not up to date (Samah, 2012).

Many researchers see the importance of employing modern technology, especially smartphones in the teaching of a second language to encourage self-learning (Al Aamri, 2011; Sahrir, 2013; Golonka et al., 2014). They believe that language games have an impact on students' achievement by training students to practice the language in their natural positions (Balqis & Marei, 2001; Al-Suwiyrki, 2005; Al- Bariy , 2010). Gamification also has the potential as an evaluation tool (Menezes & Bortolli, 2016), considering it carries students the elements of self-recreation and self-expression, followed by the possible achievement of emotional and cognitive goals. Thus, HAMOODY SMARTPHONE application can act as language training game performed by the learner under the supervision and planning of the teacher, which is flexible, repeatable and help learners. HAMOODY SMARTPHONE application is like other language games, also effective in developing speaking skills among learners and encouraging them to continuously self-learn (Musa & Hasb al-Nabi, 2011).

Combining the evaluation criteria of IELTS and MUET speaking tests, four important elements of a good speaker are identified, which are: 1) confidence, 2) understanding, 3) grammar, and 4) pronunciation, HAMOODY SMARTPHONE application employs all the four aspects in the games it present.

The importance of HAMOODY SMARTHPHONE to education

This application allows self-learning as it indirectly exposes the learners to the correct grammatical construction of the sentences and precise pronunciation. This is possible because direct method is used where Arabic, the target language is utilised throughout the 30 levels of language games.

The game is also suitable for learners because it can lower their affective filter. The Affective Filter Hypothesis, credited to Stephen Krashen, an expert in linguistics, declares that a student's anxiety, low self-esteem, or lack of motivation can serve to cause a mental block preventing the successful acquisition of a second language. HAMOODY SMARTPHONE is a fun app, and thus can lower (even zero-Arabic) students' anxiety.

Another importance is related to the technology acceptance model (TAM) which is a theory that is most widely used to explain an individual's acceptance of an information system. According

to TAM, ease of use and perceived usefulness are the most important determinants of actual system use. This fits HAMOODY as it is user-friendly. Furthermore, HAMOODY SMARTPHONE is also student-centred where students can proceed according to their own individual pace, making learning more flexible.

Advantages of your innovation

HAMOODY SMARTPHONE is advantageous in terms of its development, foundation, and uniqueness. Its development is research-based. Thus, the outcome of its usage is empirical the development is based on research findings conducted on beginners of Arabic learners at the University of Sydney, Australia. Table 1 shows the result of the research:

Table 1: Results of the research conducted at the University of Sydney, Australia.

	T-Test			Independent Samples Test				
	Test	N	Mean	Levene's Test for Quality of Variances		T-test for Equality of Means		
				F	Sig.	T	df	Sig. (2-tailed)
Confidence	Pre	15	9.86	EVA	1.735	0.199	11.98	28	000
	Post	15	71.40	EVNA			11.98	25.64	000
Pronunciation	Pre	15	8.20	EVA	0.098	0.757	19.22	28	000
	Post	15	81.20	EVNA			19.22	27.28	000
Grammar	Pre	15	2.73	EVA	8.417	0.007	8.17	28	000
	Post	15	41.39	EVNA			8.17	16.01	000
Understanding	Pre	15	7.73	EVA	1.718	0.201	10.67	28	000
	Post	15	55.66	EVNA			10.67	21.68	000

HAMOODY SMARTPHONE has a solid theoretical foundation. Apart from the TAM and Krashen's Affective model, it also embeds the Learning styles of Gen Z and alpha who are digital natives (Prensky, 2001). This promotes autonomous learning. Furthermore, it is unique as compared to other applications, as described in Table 2:

Table 2: Comparison between HAMOODY SMARTPHONE and Other Applications.

	HAMOODY SMARTPHONE	OTHER APPLICATIONS
Focus	On enjoyment of the game	More on language than game
	On the development of listening and speaking skills	General (more to reading skill)
	On the skill level of learners	On the age of learners
Approach	Use of target language	Use of translation
Attention	Subconsciously	Consciously
	Attention to play	Attention to learn
Learning Point	Construction of simple sentences	Development of vocabulary and memorization of sentences

Commercial value

With all the properties that address the up-to-date trends of learning Arabic especially for the current generation, HAMOODY SMARTPHONE has the potential to go far. The fact that it is an application on smartphone is a great selling point as the digital natives and gadgets are inseparable. Thus, it is a convenient method of learning. On top of that, purchasing is easily done via mobile apps. Moreover, mobile applications are renewable in terms of upgrading the levels, including more words and input, making the challenges more demanding, topping up with more interesting features, just to name a few enhancements that can be done along the way. Hence, HAMOODY SMARTPHONE is not an overnight success, it has the prospect of being perpetual through ongoing ameliorations in keeping abreast with the current landscape of teaching and learning.

Conclusion

The weakness of speaking skills in Arabic among its learners is not new, especially if it is learned outside its real- life environment. This leads to a major responsibility for teachers to find helpful methods and approaches that encourage their students to use the language. This study showed the effectiveness of the use of smartphones in the development of Arabic speaking skill, in addition to the receptivity of learners and interaction with them. Therefore, it is necessary to take advantage of this development in the teaching and learning of Arabic to develop the language proficiency among its learners. Despite those differences and shortcomings arising from the previous observations, the positive impact in developing the skill of speaking remains the most important goal we seek. Therefore, the researchers consider the importance of continuous research in the use of smartphones, focusing on the appropriate content of language games, training and teaching decisions that help learners and encourage them to practise self-learning to reach greater benefits in the field of teaching and learning of Arabic, especially among its learners.

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DIGITAL CREDENTIALS: RECOGNIZING STUDENTS LEARNING EVIDENCE IN ARCHITECTURE HISTORY AND THEORY MODULE

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Highlights: Micro-credentials are mini-certifications that help to recognize the student's skills in specific area of studies, which are awarded through the digital badges. Applied in the Architecture History and Theory Module, this alternative credential will provide students with the opportunity to demonstrate their knowledge and skills earned by submitting learning evidences that aligned to specific and timely needs of the modules and the workforce.

Key words: micro credentials; virtual learning; education; architecture; digital badges,

Introduction

The module is one of the compulsory modules offered to Bachelor of Architecture students. The nature of the modules that required the students to memorize lots of images and timeline related to Architecture has made this module a dry and challenging subject for the students. The class observation also indicated that with all the facts to be memorized, the students have short attention span during lectures and tutorials, and these situations have led to the student's low performance in the module. To overcome this problem, numerous assessment have been introduced and made available through the university's learning management system (LMS).

Before the F2F lecturing, students are required to explore the online resources in TIMeS. This helps them to recap their prior knowledge. During lecture, several visual presentations and Student Response System are used during class for student discussion and feedback. After the lecture, students are required to attempt all the online activities in TIMeS. Help and support such as peer tutoring are there for continuous reinforcement. The learning process will be evaluated by assessments (formative and summative) that are aligned with the learning objectives during the tutorial sessions. In these modules, the content is visually designed to get the students' attention

and attract their interest. A variety of activities are designed using TIMeS. These online activities consist of questions in various formats and are associated with response and feedback. Experiential learning such as interaction lesson, simulation, scenario and game-based activities engage student's intellect and imagination to foster deep understanding. Through the use of badges, students get recognition and achievement through completing tasks that aligned with the badges. Display of badges earned: a display board was created to show the badges earned for the module.

Based on TIMeS usage factsheet in Taylor's University, this module site had won numerous awards in Taylor's University, including the most active module in the university level. Course evaluation showed that The Digital Badges had change the students attitude in learning Architecture History and Theory and they liked this teaching innovation using various kinds of emerging technologies. This then linked to the Taylor's Graduate Capabilities where several skills are achieved in the module. The digital credentials demonstrates how to leverage cutting-edge technologies to create innovative learning environment in a "dry" History subject. The use of interactive game-based learning and engaging SRS could transform traditional teaching methods in the module. Other practices that used in the module, such as flipped classrooms and blended learning also serve as potential bench marker for effective and creative e -Learning. It transforms a dull and boring subject into a life and engaging one. It creates a richer and more interactive content and increase student engagement and active participation.

Figure 1: The Structure of Digital Credentials in Architecture History Module

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DIGITAL MICRO-CREDENTIALS (MCS) AND BADGES: MULTI-SKILLING THE HOSPITALITY INDUSTRY

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Highlights: Digital micro-credentials (MCs) and badges offer new, in-demand, shorter, personalised and online modules which has attracted a growing number of adult learners. The digital MC and badges offered under the "Executive Certificate in Hotel Performance and Analytics" play a crucial role in multi-skilling people in the hospitality industry. This industry was one of the first to be hit by the pandemic and most likely the last to recover. This time period provides an excellent opportunity for hospitality employees who seek new knowledge to upgrade their credentials by following this micro-credential offered through synchronous and asynchronous study modules and to complete online assessments to earn digital badges.

Key words: micro-credentials, digital badges, hospitality industry, professional development

Introduction

"Micro-credentials go by various names including 'nano-degrees', 'micro-masters credentials', 'certificates', 'badges', 'ratings', 'licenses', 'endorsements,' or 'memberships.' As their name implies, micro-credentials focus on modules of learning much smaller than those covered in conventional academic awards, often allowing learners to complete requisite work in a matter of weeks. In their most developed form, micro-credentials represent more than mere recognition of smaller modules of learning." Milligan and Kennedy (2017).

Description of the MC

The MC – Executive Certificate in Hotel Performance and Analytics – was created to have features such as stackability (Milligan & Kennedy, 2017) building into a larger award, the Master in International Hospitality Management (MIHM). The short 7-week course is a bite-size piece of the MIHM delivered synchronously via online platform, asynchronously via video and assessed through quiz checkpoints. There are three digital badges to be earned while completing the MC. Digital badges have two potential benefits: learner motivation and documenting learning activities (Yu, Dyjur, Meltenburg & Saito, 2015). Many digital badges can be shared via social media tools such as LinkedIn, Facebook, helping to increase learner motivation and tracking one's learning accomplishments.

Figure 1: Digital badges offered in the Executive Certificate in Hotel Performance and Analytics

Background

In 2019, the Malaysian Qualifications Agency (MQA) issued the "Guideline on Micro-Credential" because it had recognised that the high cost of college degrees, the duration of study and the mode of delivery have spurred many alternative and innovative providers of higher education to come up with more attractive education opportunities (MQA, 2019). MCs are awarded to learners for successfully completing a set of units or modules popularly delivered through e-learning modes.

Many developments have spurred the emergence and popularity of MCs. The 17 United Nations Sustainable Development Goals (UN SDGs) calls for more access to quality education for all throughout the lifespan of citizens to address socio-economic inequality (https://sdgs.un.org). Open and distance learning which can be delivered synchronously and asynchronously using e-learning, fully online education and mobile can reach out to a larger audience overcoming geographical and mobility obstacles. The high cost of university education and growing disquiet about employment created a market for cheaper, shorter, targeted and industry support credentials.

In the hospitality industry, many senior professionals are rich in skills and experience but lack the recognition of a traditional education award. The digital MC was created to allow time-constrained hospitality professionals the flexibility in obtaining a MC in hotel performance and analytics at their own pace within the 7 weeks. This type of digital MCs has the potential to allow people to set flexible and personalized learning goals, defining what professional learning opportunities are meaningful to them (Yu et al., 2015).

Context

The creation of the MC in "Executive Certificate in Hotel Performance and Analytics" meets the demand in the hospitality industry to recognise the knowledge in hotel performance and conducting property benchmarking and competitor analysis. This MC starts with an attractive video promotion which can be accessed from this link: https://youtu.be/8BFO5IYAyJc. All lecture videos are an interactive, with H5P (HTML 5 Package) inserted in the middle of the video to gauge students understanding. Link to Interactive lecture video: https://youtu.be/MSzCfkRUJf4.
Importance to education and community

The driving factor that accelerates the development of MCs in Malaysia is the widening university-industry skill gap (Soon & Ismail, 2021). This is quite glaring in the hospitality industry which was the first to be hit by the Covid-19 pandemic and most likely the last to recover. As a benefit and great advantage to the hospitality industry, micro-credentialing is a workable and accessible option in addressing structural unemployment. It forms a solid bridge that can link the chasm between one's existing skills and those needed in the constantly changing professional job market made even more dynamic by the pandemic (Soon & Ismail, 2021).

Commercial value - profitability

The introduction of MCs in the Malaysian's higher education landscape provides a feasible pathway for advancing a higher institutions' programmes and courses by providing an additional source of revenue. By using their existing expertise into developing MCs, designing compressed online courses with highly targeted curricula, suitable for employees of hospitality industry in need of workforce development; this has opened up new revenue sources (Gallagher, 2019).

One way to improve programme efficiency and profitability is to unbundle educational products and services (Ralston, 2021). By unbundling a module from the MIHM, the intention behind this unbundling strategy is to enhance efficiency, i.e. the same number of academic staff instructing more students and generate revenue. By segmenting or unbundling an existing curriculum, academic departments effectively create new profit centres (Ralston, 2021).

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GAMIFYING VIRTUAL DELIVERY OF LAW MODULES USING LAWLEYPOP APP

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Highlights: In today's world, technology has drastically changed the way students learn. Traditional learning techniques such as listening and taking notes in the classroom, memorize and regurgitate information in the examinations have gradually given way to more modern learning strategies. Over the years, higher education institutions have experienced a technology change to improve learning. As of March 2020, the entire higher education ecosystem embraced virtual teaching and learning as a result of COVID-19 pandemic. LAWleyPop app was developed as a response to the ad hoc shift in the virtual learning faced by the law students. LAWleyPop includes element of gamification to boost learner engagement and learning retention, providing more rich and structured learning experiences to the students albeit virtually. The innovative project of developing LAWleyPop app involves a collaboration between two schools namely Taylor's Law School and The Design School at Taylor's University.

Key words: *Law Modules, Virtual Learning, Gamification, Augmented Reality, COVID-19 pandemic*

Introduction

Content

'LAWleyPop' app was initially designed in January 2020 with the objective to provide a new learning strategy for law students to learn English Legal System and English Land Law in times of Fourth Industrial Revolution. LAWleyPop intends to address the gap in the existing module learning outcomes by providing a platform for students to identify legal problems and showcase their ability to provide innovative legal solutions. LAWleyPop app incorporates elements of gamification in developing intuitive learning design and exciting game simulation in the spirit of learning law. LAWleyPop is not a game per se but a simulation of game playing whilst learning law. The application of game elements in learning law, being a non-game environment, is known as gamification. By gamifying law using LAWleyPop app, law students will be immersed in a role-play activity to resolve existing challenges and to acquire a sense of victory. LAWleyPop app incentivizes regular learning where students will feel rewarded at the end of the day after completing the task on LAWleyPop app.

Below is the design process of students' journey is learning law using LAWleyPop app:
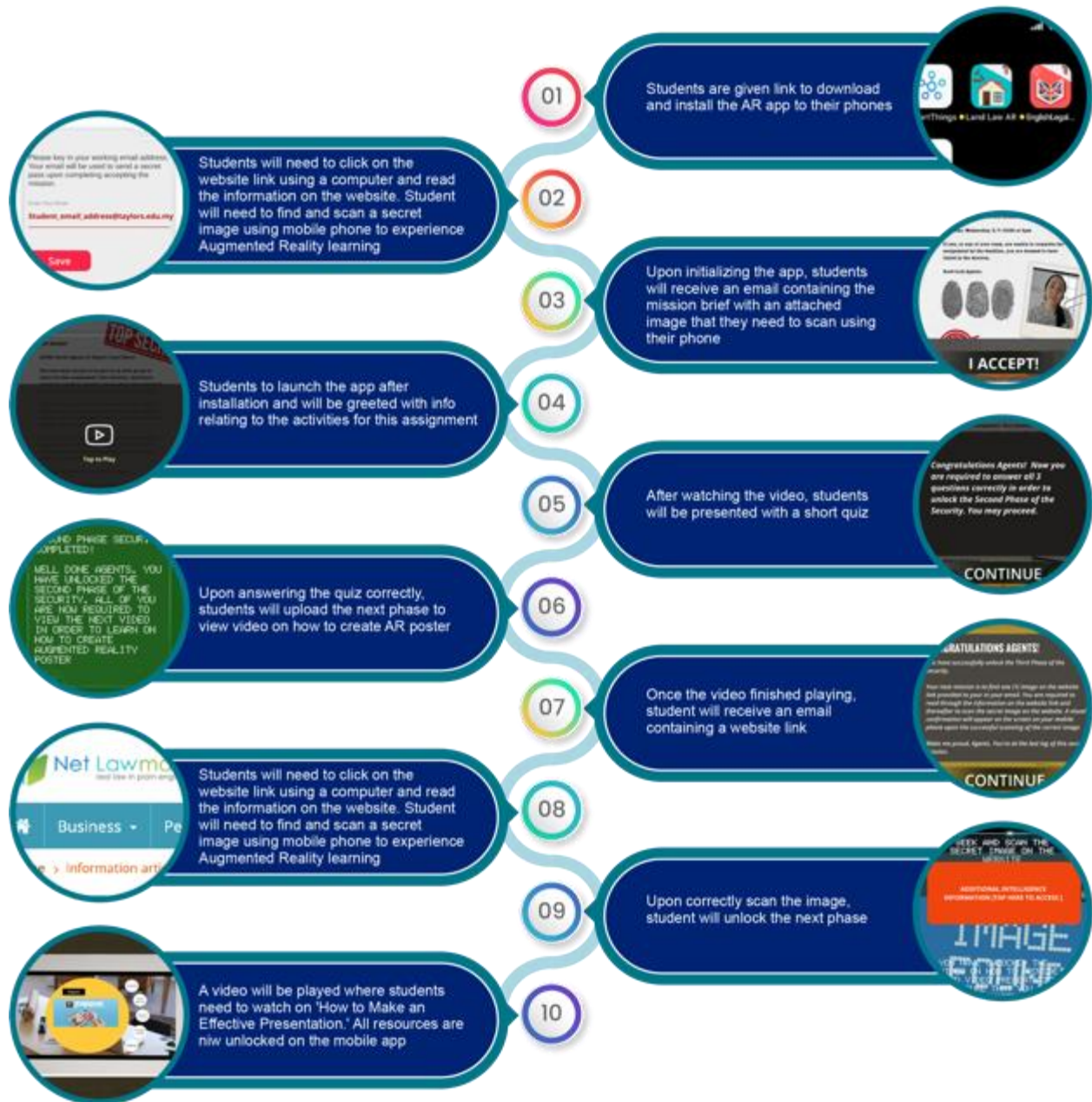
A 2015 study by Microsoft found that a person's average attention span has dropped a staggering 33% from 12 seconds to 8 seconds (McSpadden, 2015). The dramatic decline in learners' ability to focus is largely attributed to the rapid reliance on the Internet resulting in shorter attention spans. In addition to that, the advent of new technology is making information accessible to the public freely and seamlessly. This has caused a grave concern with regard to the job security for law graduates. The new creation of legal technology is able to automate work, conduct systematic legal research – causing worry whether law graduates will be able to thrive in the digitalize world.

In March 2020, the specter of ad hoc shift in virtual learning is causing students to feel demotivated, lost and uninspired to learn virtually. Hence, a team of 3 educators from Taylor's

Law School and Taylor's Design School jointly collaborated to design a mobile app called 'LAWleyPop' with the aims to sustain students' attention and interest to learn law virtually, to inculcate the innovative spirit amongst the law students to create their own Augmented Reality project and to instill the spirits of life-long learning regardless of their location.

When LAWleyPop was launched in June 2020, it has uplifted students' spirit to learn law virtually to the extent that it has resulted in significant increase in law students obtaining grade 'A' for English Legal System and English Land Law modules. In August 2019 semester, there were only 2 students obtained grade 'A' and 10 students obtained a grade 'A-' for English Legal System module. Comparing August 2019 semester with March 2020 semester, there is an increase of students obtaining grade 'A' from 2 students (1.75%) to 12 students (15.38%) and for grade 'A', there is an increase from 10 students (8.77%) to 21 students (26.92%).

Similarly, for English Land Law module, there was no student obtained grade 'A' in August 2019 semester. However, in March 2020 semester, there is an increase from 0 student to 1 student (2.32%) who obtained grade 'A' and 5 students (11.62%) obtained grade A-' as compared to 3 students (4.47%) obtained grade of 'A-' in the previous semester. The sharp increase in students obtaining grades of A and A- indicates the effectiveness of LAWleyPop app.

LAWleyPop app is important to education because it has been observed to be able to develop students' ability to learn law independently and enhance their creativity, critical and creative thinking skills. In using LAWleyPop app, students' affective aspects are also sharpened as they are able to collaborate amongst local and international students, in different countries using online platforms. In fact, LAWleyPop is able to develop students' self-actualization which is an important role in students' growth (Shiv Tripathi, 2012). LAWleyPop can also widen students' horizons in learning law as the elements of gamification in LAWleyPop app allow the students to embrace new strategies to learn law and to thrive in COVID-19 world.

LAWleyPop was carefully designed to instill the elements of 'intrigue-ness' for the law students to learn law by assuming a role of a 'secret agent' with the aim to develop students' cognitive thinking the moment they received the 'assignment briefing'. Students' cognitive aspects will be tested as they need to ensure that they are able to capture all possible legal issues provided in the LAWleyPop app. Students will be assessed on their ability to listen to instructions, think creatively and critically, be open to new ideas and collaborate remotely. In relation to students' behavioural aspects, the students have demonstrated that they become more confident to attempt any legal challenges posed to them after using LAWleyPop app. They have also shown that they are receptive to the new concept of learning and communicate effectively albeit remotely. LAWleyPop app serves as a step closer for legal education to be revolutionized. In today's fast-paced and competitive environment, LAWleyPop can motivate students to try new things, results-oriented and learn law regardless where they are. LawleyPop app can benefit the legal education sector by creating higher learning engagement which will then lead to higher learning retention and productivity. LAWleyPop app instills the value of life-long learning where anyone can learn law anywhere, making learning law to be more effective, meaningful and impactful to the community (Khan, Johnston and Ophoff, 2018).

LAWleyPop app currently showcases two law modules but it can be adaptable and scalable to include all law modules which can be adopted by all law schools in Malaysia, England or any Commonwealth countries. The informative content available on LAWleyPop app can also be useful to the law students and members of the public seeking legal information on specific areas

of law. LAWleyPop app has a valuable commercial value given that the information provided can assist law students and also the members of the public in learning law. Currently there is no mobile app in Malaysia or in ASEAN that focuses on the delivery of law modules, hence it can be marketed to the public. In fact, various investors have expressed interests in funding the development of the LAWleyPop app which is currently in the stage of negotiation.

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TRACKING STUDENTS' CO-CURRICULAR ACTIVITIES THROUGH A DIGITALISED INNOVATIVE LEARNING SOLUTION

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Highlights: Taylor's aims to produce holistic, future-ready, and highly employable graduates through the integration of academic and co-curricular excellence via the Taylor's Curriculum Framework (TCF) 2.0. Students will graduate with the Graduate Capabilities Statement (GCAS), demonstrating how they are assessed in their Taylor's Graduate Capabilities (TGC) in and outside of the classroom. The SHINE Award recognises students' experiential accomplishments via co-curricular activities. Their progress will be tracked via the SHINE Portal, a one-stop centre empowering students to demonstrate their TGCs through the immersive SHINE Learning journey, increasing their chance at employability.

Keywords: Holistic Education, Employability, SHINE Portal, Curriculum Design, Gamification, Future-Ready

Introduction

According to Humanology, (2020) one out of every five graduates remain unemployed for six months after graduation in Malaysia. The Ministry of Education Malaysia's Graduate Tracer Study shows that nearly 60% of graduates remain unemployed for one year.

The Graduate Tracer Study attributes this to poor communication, entrepreneurial, analytical, and critical thinking skills besides poor mastery of the English language. This demand necessitates an education pedagogy that does not just develop, but also objectively measures and records students' soft skills, hence the establishment of the TGCs (Figure 1).

Figure 1: Taylor's Graduate Capabilities

Taylor's launched TCF 2.0, which integrates the SHINE Award into the curriculum to incentivise student commitment towards co-curricular activities (CCA). This enables Taylor's to focus our efforts in producing a higher percentage of graduates who will be future-ready especially in this era of Fourth Industrial Revolution.

Name   : MOHD ADAM BIN SHAUPIK
Student Number   : 0311987
Programme   : Bachelor of Engineering(Honours)Mechanical Engineering
Intake Number   : January 2020
Date of Issue   : 03 December 2020

Semester	PLO01 Global Perspective	PLO02 Discipline-specific knowledge	PLO03 Problem Solving, Critical and Creative Thinking Skills	PLO04 Problem Solving, Critical and Creative Thinking Skills	PLO05 Discipline-specific knowledge	PLO06 Discipline-specific knowledge	PLO07 Discipline-specific knowledge	PLO08 Entrepreneurialism	PLO9 Social Competencies	PLO010 Communication Skills	PLO11 Personal Competencies	PLO012 Lifelong Learning
Jan 20	3.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	3.86	0.00	0.00
Mar 20	4.00	3.34	0.00	4.00	2.60	0.00	0.00	3.25	3.60	2.53	4.00	2.67
Aug 20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PLO WCGPA	3.61	3.34	0.00	4.00	2.60	0.00	0.00	3.25	3.65	3.21	4.00	2.67
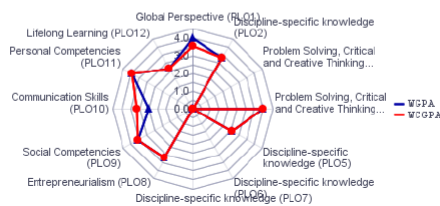
Figure 2: Hypothetical data for Graduate Capabilities Attainment Statement

Background

The TCF 2.0 is a unique framework that formally recognises all students' academic and CCA engagements via the GCAS and the SHINE Award. The integration of students' academic and CCA journey can be seen through the SHINE Award eligibility requirements awarded in two levels.

The first level of awarding is based on students' PLO Score where students' demonstration of TGCs are measured and attested in the GCAS (Figure 2). The second level is through the accumulation of SHINE Points which enable students to upgrade their SHINE Award using their PLO Score. SHINE Points are awarded to students who demonstrated their TGCs by taking on roles in CCA.

To track and reward students' CCA involvement, the SHINE Portal innovatively uses e-Learning components through the SHINE Themes focusing on the TGCs. There are 4 compulsory themes and 1 optional theme. The SHINE themes can be seen in Figure 3.

The Portal can manage, track, evaluate, recognise, and reward students' involvement and completion in all approved activities while dispensing SHINE points. SHINE points are dispersed based on the first four principles in any one of the 5 SHINE themes (Figure 3). Student's role completion is concluded after their reflection submission with evidence of their participation. A reflection marker then validates the student's completion and points are dispersed via the portal.
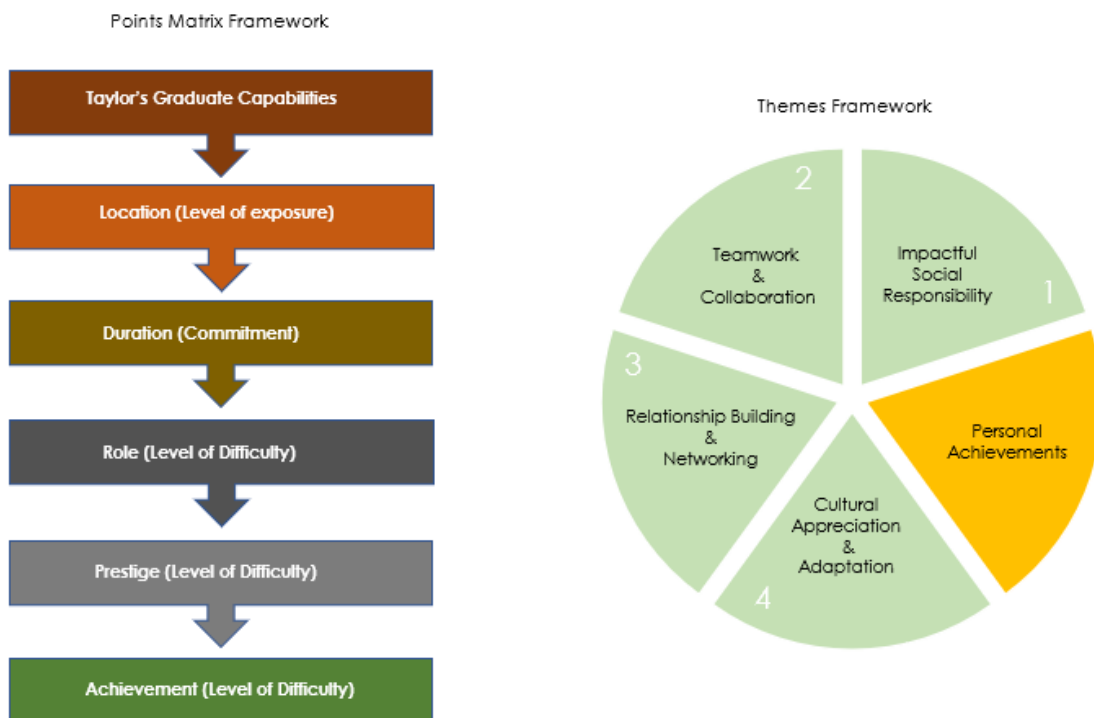
Figure 3: Framework of Points Matrix and Themes in SHINE Portal

The SHINE Portal provides administrators with the function to configure SHINE points matrix based on the six key principles against the SHINE themes.

This self-directed learning portal motivates learning outcomes through point accumulation and reward-based learning via digital badges, testimonials, star ratings and e-certificates, which can be pinned to students' achievement boards and shared on social media.

Impact on Students of Higher Learning

The TCF2.0 places an importance in students' life-skills achievements captured through the SHINE Portal. Students' SHINE journey exposes them to experiential learning and skills that are not confined to their area of study.

The kickstart to the SHINE Learning Journey is the Life Skills programme taken by all First-Year students as core modules. The Core Purpose assignment in the SHINE Portal is a crucial first exercise for students to think about their goals and values that may guide and navigate their decision- making process.

The Personal Development Plan (PDP) is a goal-setting tool that helps students identify at least 3 goals associated with their core purpose that they can achieve in University. To complement the PDP, the Networking Map available on the SHINE Portal enables them to pave a pathway that connects them with industry leaders, mentors, or equivalents. These connections will prove advantageous to the students in the long run as resources for their future success.

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Apart from personal branding, the SHINE Portal is also used as an avenue to find communities with similar interests via the Discussion Board and Directories. This helps initiate start-up projects such as talent search, awareness campaigns, donations drive, sporting activities, and more.

Experiential Opportunities posted by SHINE Partners (corporations, industry leaders, civil society organisations, community-based organisations, etc.) expose students to real- life work experiences internally and globally, building networks that will give them an edge when seeking employment or when starting a business. Students will gain powerful experiences that positively impact their learning and the communities they live in.

Lastly, for every role completion, students are required to reflect and think critically about their experience by identifying the areas of strengths, improvement, and submission of evidence for the roles performed before receiving the commensurate SHINE points. Reflecting enables them to unpack their experiences and learn from them by answering guided questions, encouraging critical thinking through a self-evaluation of their performance.

SHINE's Silver, Gold and Platinum Award awardees would possess an advantage over other graduates due to the number of industry immersion opportunities they would have accumulated in various fields. These graduates will be highly sought after by employers. SHINE provides graduates with a recognized standard of the pedigree of their capabilities, positioning SHINE as a recognizable brand name synonymous with excellence and achievement.

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5E FRAMEWORK: AMPLIFYING THE FIRST YEAR ARCHITECTURE STUDENTS LEARNING EXPERIENCE

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Highlights: Guided by the 5-E Framework, the LMS activities have been created based on the structure set by the 5-E Framework: Engage, Enhance, Extend, Evaluate, and Earn. The implementation and combination of this Framework with technologies are expected to amplify students' first-year learning experiences. The feedback outcome from the student's survey has shown that the 5E Framework amplifies their education experience and has helped them understand the module's concept and theory.

Key words: online; virtual learning; education; architecture; 5E Framework

Introduction

The module Design Communication is one of the compulsory modules offered to Bachelor of Architecture students. The module introduces fundamental skills for the appropriate communication of architectural design. It engages different means of visualization and expression of space and spatial ideas through architectural drawings to prepare students with the skills required in design projects. These skills are taught through a series of freehand and constructed drawing. The teaching and learning approach for the module will be lecture and tutorial based, with students engaging with hands on lecture and blended learning experience during the lecture and tutorial session

However, due to the Covid-19 Pandemic, as an added safety precaution, the University announced an extended social distancing period at the University from 13 April until 31 December wherein all classes, including assessments, will move online. Due to the nature of the studio based module, to overcome the challenges, numerous assessment have been introduced and made available through the university's learning management system (LMS) application in virtual environment.

Hence, students are being exposed to the technical and online technology applications that will be able to help them to achieve the learning goals. By using this online application, the 5-E Framework makes sure to consider that while a tool may be "drill and practice", the educator can create structures around the tool to help meet the five different components of the framework.

Apart from that, the students are awarded with badges that act as a micro-credentials. Micro-credentials are mini-certifications that help to recognize the student's skills in specific area of studies, which are awarded through the digital badges. This alternative credential will provide students with the opportunity to demonstrate their knowledge and skills earned by submitting learning evidences that aligned to specific and timely needs of the modules and the workforce.

5E Framework in Design Communication Module

The Triple E Framework, developed in 2011 by Professor Liz from University of Michigan, was created to address the gap between the usage of education technologies and teaching practice in the K-12 classroom. It is designed to help the educators in evaluating suitable technology tools to meet their learning goals through a set of questions developed for the three components. These questions are provided to help assess the tools and design the learning experiences so that the tools have a positive impact on student achievement and learning outcomes.

Thus in this project, enhancement of the framework were done and improved to The 5-E Framework. Creation of interactive activities provides students with immediate feedback on their performance. This is an excellent way of encouraging and motivating students to perform a task and reinforce their learning. Compared to traditional lecture and tutorials, these online tools extend the capabilities of the classes more playfully and interactively. Furthermore, it promotes self-directed learning as learners can do activities at their own pace and in their own time. When students complete an activity, their performance is recorded in the LMS. This learning analytics helps lecturer to monitor student's performance and identify weak students in the classroom.

Figure 1: The Structure of 5E Framework in Design Communication Module

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FINANCE LIVE SHOW: A SOLUTION FOR LARGE ONLINE LECTURES

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Highlights: One of the biggest challenges of online learning is to ensure students concentrate on the academic subject taught. To enhance students' engagement and improve their learning, we replaced our finance online lectures with 'Finance Live Show'. The 14-episode 'Finance Live Show' was designed to deliver the content in an informative, interactive, entertaining, and accessible way. Students showed a higher level of cognitive engagement by going beyond the basic requirements and welcoming challenges rather than lower-level cognitive engagement that involves rote memory. Analysis, interpretation and connecting new knowledge to prior knowledge were evident in students' responses to the activities in class.

Key words: Online learning, finance, engagement, cognitive engagement, interactive.

Introduction

One of the biggest challenges of online learning is to ensure students concentrate on the academic subject taught. It is unsurprising that students in online modules are often multitasking with non-academic matters such as browsing on social media more than the f2f classes. The instructor and peer pressures that somehow can limit the 'off-task' browsing during the physical class fades away in online classes. On top of the above challenges, engaging the learners in a class with 300-500 students from various programs with different interests and backgrounds has always been a concern for lecturers teaching large classes. To tackle the above-mentioned issue, the 'Finance Live Show' was designed to achieve the module learning outcomes by delivering the content in an informative, interactive, entertaining, and accessible way.

We fabricated the finance lecture like a 'live TV show' with different professionally made items. Some items for each week live show were recorded using a 'lightboard' studio whereas other items including fun items relevant to each week topic used to be recorded one week prior to the weekly lectures. We used a professional streaming software Cloud-based Open Broadcast Software, for live streaming at the lecture time as well as Camtasia software package to edit the videos.

Knowing the digital native generation tendency towards YouTube, we used 'YouTube' live streaming as the main platform through which we can claim the technical problems for online large classes were resolved. The quality of the live classes was HD and students could watch the live lectures with English subtitles. For YouTube streaming, we opted for the 'public' option and the live class was available to the world. Gradually the turn-up number became greater than students enrolled in that module. Apart from our own and students' family members and friends, we had some external active participants from other universities and other countries in class.
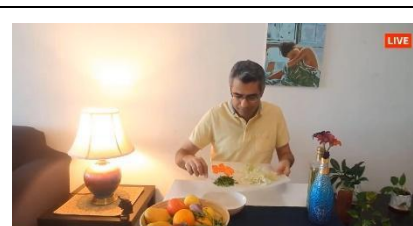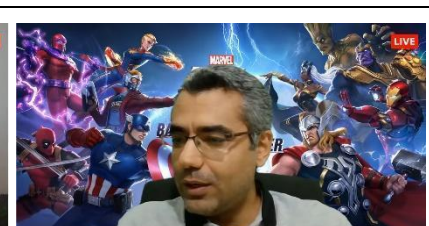
Having a motto of 'finance is fun', we used to surprise the students with unexpected video items after feeding them some finance concepts. The various items in each episode of the show consist

of topic specific intro videos, lightboard pre-recorded videos, recorded videos in our home studio, live stream chat, surprise videos and along with gaming and activity platforms such as Slido, kahoot, quizzi etc.

Before each live lecture, we arranged the sequence of more than 10 recorded videos in the software to make sure we can manage playing them after each explanation. Since some calculation videos are recorded in lightboard studio and some at home, this combination makes them interesting. The fun and surprise videos are relevant to the weekly topics. For example, teaching financial statement 'ratios', we recorded some videos about the 'ratio' of exercise in our daily chores. In the balance sheet topic, the surprise video was about the balance life in which we were preparing salad in the kitchen.

Towards the end of each online session there was a 'wrap-up activity' which provided students a chance to reflect on what they learnt. The attendance used to be captured via students' engagement in these types of activities during the class. The last item in each class was getting students feedback about class. Students' weekly satisfaction rate was consistently above 90% with a participation rate of more than 85%. Moreover, addressing students' concerns/feedback the week after induces the sense of ownership about the module makes them realize that their opinion means to us. Figure 4 shows some of the items used in each episode of Finance Live Show. Moreover, each week some specific moments of the Finance Live Show were shared in students' Instagram stories which is an indication of their positive emotional reactions, interest, and attitude towards the Finance Live Show. Another indication for the students' affective and behavioral engagement was using 'my', 'we', 'our', 'us' in their posts/comments in social media (Lashari et al., 2013; Majumdar, 2003). For more information, please see https://youtu.be/y5JGrZlasSk

Figure 4. A sample of various items that were used in each episode (each class) of the Finance Live Show

Opening sequence

An intro to connect the finance topic to real life issues. The intro is always a surprise! For example, talking to students while I'm cooking, playing musical instruments, etc.

In the studio talking with students between the items preparing them for the next item.

Playing videos that have been prepared in a lightboard studio as well as teaching some topics in a live session.

Playing online activities: Online games, online quiz, etc. to assess them during the show.

Talking to my students through live chatbox and going live on Instagram to talk to them during the show (lecture).
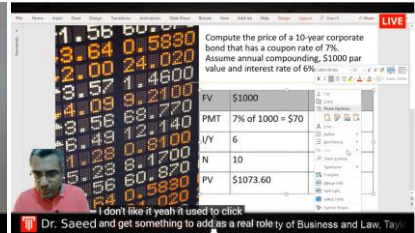
Streaming several entertaining videos related to the topics.

Some videos were prepared before the live sessions.

All live sessions are in HD quality, with English subtitle, and a live interactive chat box

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DIGITALIZING ETHNIC RELATIONS ASSIGNMENT THROUGH PROJECT-BASED LEARNING

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Highlights: Please provide a 50 - 100 word summary of your invention/innovation/design

Ethnic Relations assignment was digitalized through Project-Based Learning and the learning framework adopted from Constructivism Learning Theory and Kolb's Learning Cycle. The entire project has been structured systematically with detailed instruction, interactive content, activities, and reflective corner. The main objective is to assess the students' ability to transfer Knowledge into real-life applications while deepening their critical skills. This pedagogy helps Gen-Z to maintain a longer attention span, interest, and engagement. Moreover, the project was conducted 100% online and by students' initiatives under instructors' supervision. Furthermore, this pedagogy helps Gen-Z to maintain a longer attention span, interest, and engagement.

Key words: project-based learning, Kolb's learning cycle, Ethnic Relations module

Background of Innovation

The pedagogy of this project was adapted and improved from existing pedagogical practice and theoretical approaches. It has drawn and coined from Constructivism Learning Theory. Students need to form groups and conduct a project with communities in Selangor state. It is a teaching method in which students learn by actively engaging in real-world and meaningful projects. Students work on a project over an extended time, from one week up to a semester that engages them in solving a real-world problem or answering a complex question. Students demonstrate their Knowledge and skills by conducting a community project or presentation for a real audience.

The process of learning is firmly based on learning theory and truly innovates according to Kolb's Learning cycle: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. This assignment needs students to use social media such as Telegram, WhatsApp, YouTube, and Instagram to expose students to a real-world situation. Students must write their e-critical reflection before, during, and after the project using Gibbs' Model of Reflection. Weekly consultation is conducted with students to offer constructive feedback, clarifying the purpose, and discussing students' assignments' progress. At the end of the semester, students need to present their project using 5 minutes rapid presentation approach and submit their reports by creating an electronic portfolio using WIX or google sites.
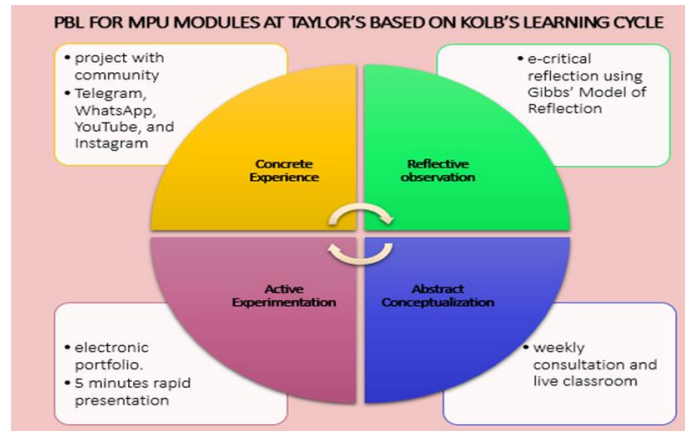
Figure 1: Learning Framework

Advantages

There are a few innovations and improvements that we have made to make sure our project incorporated different elements such as:

Embed the latest teaching and learning technologies and social media.

The ways we embed technology to accelerate, diversify and add value to learning by creating new pathways to access and apply Knowledge and explore learning partnerships beyond the classroom.

It provided immediate feedback during the students' assessment.

Students will get instant feedback when they submit their proposal, e-portfolio, and oral presentation. Instant feedback allows the students to know their current status, strengths, and weaknesses. Abstract conceptualization happens where learning comes from the experience, synthesizing new Knowledge and perspectives.

Expose students to real-world problems and issues by working with the community.

Students' projects with the community are processes whereby Knowledge is created through the transformation and concrete experience. Students gained Knowledge from grasping and transforming the experience and direct engagement with the community in authentic project-based learning.

Encourage a self-paced learning environment.

This project created the climate and culture for learning that is openly accessible anytime and anywhere. These are spaces where students are empowered to take responsibility for their learning, both offline and online.

Impact

Project-based learning for the Ethnic Relations module impacted students in many ways. This project has proven to be one of the most effective ways to engage students and provide a practical learning application. It provides students with opportunities to create authentic projects which are personal and meaningful to them. Students can pursue their interests, and as a result, opportunities for learning for students are tremendous. Students' results improved as the number of students obtained A grade increased drastically and the failure rate significantly decreased.

Project-based learning also impacted students' engagement in many areas. It shows that students' completion rate is high with more than 95% with a 100% completion rate where students completed all activities, including assignment and weekly learning activity via module site. Project-based learning became one of the most students' favorite assignments on the campus.

According to course evaluation, students' acceptance of their assignment is very high, and on average, students spend 4 hours per week doing their assignment. With more than 100 projects and 7000 participants, students deeply engaged while doing their project.

Acknowledgement

We want to express our gratitude to the School of Liberal Arts and Sciences, Taylor's e-Learning Academy, and Jabatan Perpaduan Negara dan Integrasi Nasional Negeri Selangor for their support in this project.

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INNOVAGOGY IN THE NEW NORMAL: OPTIMIZATION OF ONLINE CLASSROOM WITH INTERACTIVE DIGITAL TECHNOLOGIES

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Highlights: The global direction of higher education currently focuses on online learning in mitigating the pandemic crisis. This project outlines an "innovagogy", which combines innovative instructional design and effective pedagogy: RASA (Resource, Activity, Support, and Assessment) and GRR (Gradual Release of Responsibility) model. The four elements in RASA were well-designed by leveraging on emerging digital technologies, with the aim to develop a more efficient and effective online teaching and learning. The activities and assessments were designed to be engaging, interactive and student-centered. Through the scaffolded approach in GRR pedagogy, students are empowered to be self-directed learners and take responsibility of their learning.

Key words: *Innovagogy, online classroom, digital technologies, interactivity, Pedagogy*

Introduction

We are now facing one of the most staggering threats to global education. As the COVID-19 pandemic continues, school are closed, physical class are cancelled and switched to 100% online learning. This transformation needs to be carefully planned to ensure that the specified learning outcomes are attained. "Innovagogy", the science of innovative teaching and learning, is a relatively new concept in education (Aleinikov, 2015). A truly high quality online teaching and learning is a combination of innovative instructional design and effective pedagogy (Innovagogy), which emphasizes student-centered learning and employs active learning activities.

RASA Innovative Design + GRR Pedagogy

An effective e-Learning is not just about creating digital contents. An innovative online pedagogy can improve the way students learn and amplify the online learning experience. This project outlines an effective "innovagogy" which integrates the Gradual Release of Responsibility (GRR) pedagogy in a RASA-designed online learning. RASA (Resource, Activity, Support, and Assessment) model is an instructional design model developed to support teacher to teach online in an effective manner, focusing on authentic and student-centered teaching (Hsiung, 2018). The Gradual Release of Responsibility (GRR) or "I do, we do, you do" approach is an effective scaffolding technique for online learning where it shifts the focus from the teacher to the student (Cimino, 2018; Al Mamun et al., 2020).

Table 1: Combination of RASA Innovative Design and GRR Pedagogy

RASA Innovative Design	Gradual Release of Responsibility (GRR) Pedagogy
Resources Interactive and engaging learning contents	**"I do" (Pre-class)** Students acquire new information and skills by exploring the learning contents modelled by teacher.
Activities Students apply their knowledge and test their understanding	**"We do" (In Class)** Students test their understanding by interacting with other students, teacher and content through Q & A discussion and collaboration.
Supports Helps and tools to support student learning	**"You do" (Post-Class)** Students deepen their understanding through independent practice
Assessments Measurement of student learning	

This RASA innovative design and modified GRR pedagogy enhances the existing flipped classroom. Students' progress is assessed pre-, during and post-class. The pre-class self-assessment allows students to recap their prior knowledge. Before the synchronous class, students are given a period of time to explore the learning materials in Taylor's Integrated Moodle e-Learning System (TIMeS). The content are made interactive by embedding activities and assessment using H5P tool. In synchronous class, guided instruction is given to facilitate students in problem-solving activities. Real time feedback is given to students based on individual and collaborative activities. The session is made interactive and engaging with simulation (Phet) and game-based activities (Kahoot and Wooclap). "Classroom Attendance Marking System (CAMS)" is used to mark student's attendance based on their participation in virtual class. Student learning is reinforced in post-class where they actively participate in asynchronous activities such an interactive discussion forum, engaging games/ crossword puzzle, quiz and assignment.
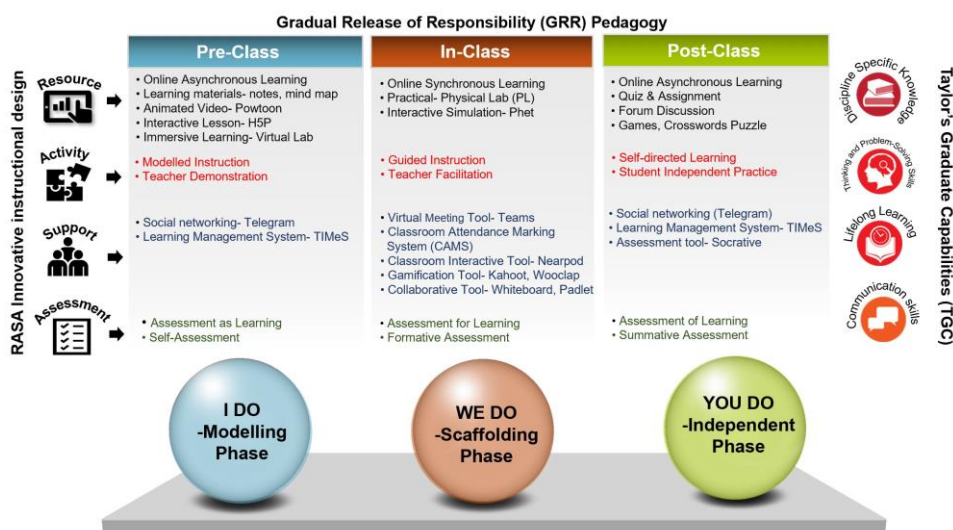
Figure 1: RASA Innovative Design and GRR Pedagogy

Advantages

1) Use cutting-edge technologies to provide flexible, interactive and engaging online learning experience

Two key elements: Interactivity and engagement can be found in the following online synchronous and asynchronous learning experience:

Engaging Content: Prezi, Whiteboard, X-minds
Storytelling: Powtoon, Videoscribe, Labster
Interactive Lesson: H5P, Nearpod, Formative, Teams
Game-based Learning: Crossword, Kahoot, Socrative, Wooclap
Real-world/Scenario-based Learning: Phet, Labster
Immersive learning: Labster, Phet simulation, Zappar
Social Interaction: chat, forum, Facebook, Remind, Telegram
Collaboration: Forum, Padlet, Poll-Everywhere
Microlearning: Telegram (low bandwidth)

2) Increase student's participation and motivation

The key focus of this innovation is the active involvement and engagement of students in their own learning. Student's learning is regularly checked through student-centered activities and assessments. The use of social networking promotes social presence and sense of community. This provides encouragement and motivation to students, so that they stay engaged and make progress.

3) Provide immediate feedback on student learning

Providing students with opportunities to practice and get frequent feedback is another focus of this innovation, so that they can monitor their learning and improve their learning.

4) Encourage self-directed learning

The scaffolding technique used in this innovation and the continuous support and feedback on student learning motivates them to become more independent and self-directed.

Commercialization Potential

This project transforms traditional teaching methods in STEM. Furthermore, the project demonstrates how to leverage cutting-edge technologies and open-source e-Learning tools to create innovative ''globalized online classroom", where students can learn anytime and anywhere.

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CATERING STUDENTS LEARNING NEEDS FOR FIRST YEAR

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Highlights: This project was designed based on the concept "no one learning approach fits all" and each student is seen as individual who has their own learning preference. This learning innovation uses choice-based approach in designing the learning activities in which students were given options to choose the right package(s) to learn chemistry content based on their prior knowledge for the topic. A series of online activities covering content learning, assessment (formative and summative) and completion recognition were designed in online platform. The activities are focusing to train students to become an active learner.

Key words: Choice-based, leaning packages, active learner.

Introduction

One of the challenges in teaching tertiary education is to cater the learning needs for student cohort who has diverse pre-university qualifications and prior knowledge for a topic content. It is not easy to teach one group of students who have little prior knowledge for the module content and at the same time bring excitement to another group of students who has already mastering the content. This is especially real for basic core modules offering in year one.

In addition to their prior knowledge of the module content, how they learn a content is also crucial in making sure they achieve quality learning outcomes (Hazel et al., 2002). However, higher education rarely provides choices in their learning activities (Frymier & Shulman, 1996). Students generally are given the same teaching material, environment setting and advice to learn a particular content topic and taking the "one-size-fits-all" approach. This is an unfortunate trend, given that students do have different learning styles and backgrounds and, consequently, find learning methods to be differentially interesting, engaging, and useful in their learning (Lewis & Hayward, 2003).

In this project, a basic chemistry topic "Introduction to Organic Chemistry" in the module CHM61104 Fundamental of Chemistry was chosen to implement the learning innovation. All the learning activities were designed in Moodle online platform (TIMeS).

Content

The learning package was divided into three levels: Beginner, Intermediate and Advance in which each package alone will meet the learning outcome of the topic. Beginner level consists of lecture recordings resembling similar experience as face-to-face lectures. This option suits those who find hard to step out from their usual learning comfort zone. Intermediate level consists of self-explore reference materials (containing mixture of text-based and audio-visual to satisfy the need to explore the content in different perspectives). Advanced level consists of case study analysis where they can relate their knowledge and applied them to real-life context. Students can choose one or combination of the packages to learn the content based on their prior knowledge and learning preference.

After the content learning, students self-assess their understanding by completing an online quiz and attempt a virtual lab simulation (Labster: Introductory to Organic Chemistry). The lab simulation consists of virtual laboratory experiment which involve qualitative analysis of functional groups of organic compounds, 3-dimentional visualization of organic molecules and quizzes to test their knowledge. In the following week after the content learning and formative assessment. Students were to submit graded assignment and lab worksheet which test their application and analysis skill. The assignment requires students to analyze organic compound present in their choice of a real-life object. While the lab worksheet consists of post-lab questions followed their virtual lab simulation. Through these summative assessments, the attainment of the topic learning outcomes can be verified, and constructive feedback was provided to students. A digital badge was awarded to students who have completed all required activities and motivate them throughout the activity duration. Calendar task reminder and completion progress bar were used to aid the students to monitor their own learning.

From a survey (n=41), 93% of respondents agreed that the learning approach is new to them and some think that it is an innovative and new way to learn Chemistry. The survey outcomes support the hypothesis that students have different learning need judging from their choice of learning packages. 52% of the choices reflected the use of beginner package, 34% choices of intermediate package and 10% choices on advance package. Majority of them also agreed that the learning packages was effective in catering different learning need. 73% agreed that they were independent enough in self-learning the content and 84% of the respondents wish to see more similar learning approach in their future study. Students' score for the summative assessment indicates an excellent attainment of the learning outcome of the topic. Averagely, students scored (83 ± 9)% for their laboratory worksheet which test their application of knowledge and scored (80 ± 12)% in assignment which tested their analysis skill in a case study.

Overall, a guided learning platform which catering student learning needs based on their prior knowledge has been developed. This enabled students who were new to the knowledge can learn by their own pace, while keeping other students who have mastered the content motivated with the online learning activities varied from text reading, 3-D spatial visualization, virtual simulation, chemical structure drawing and were highly engaging. This approach has empowered students to choose their learning approach and pave the way in training them in becoming an active learner. This choice-based learning definitely feasible to be scalable or transferable in another study field and the learning activities were all designed using tools available in Moodle platform. This approach is especially suitable for content which are fundamental and yet important for knowledge progression or topic content which relatively difficult to understand and require multiple learning perspectives.

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EMPOWERING STUDENTS WITH ONLINE GAMIFIED ASSESSMENT MODEL FOR THE CRITICAL AND CREATIVE THINKING SKILLS Module

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Highlights: The Online Gamified Assessment Model (OGAME) with 1 source of Input

Key words: *Gamification, Online Gamified Assessment, Self-Scoring System*

Introduction

The Critical and Creative Thinking Skills is a core module which is taught across six different Foundation programmes.   The pedagogical approaches were blended learning based and innovations in the gamification of this module that has involved multi-platform approaches.

The initial Online Gamified Assessment Model (OGAME) was designed and introduced in March 2020 and was adapted by studies from several creativity researchers (Kaufman & Sternberg, 2006) and specially designed self-updating gamified leaderboards (Garcia, 2017). Their studies on psychometric measurements of creativity contributed to ideas about how to quantify creative investment which had led to the OGAME model. OGAME contributed to stronger development in pedagogical engagement and transferability of critical and creative thinking knowledge and skills across multi-disciplines, inculcating gamification approaches to the online classroom pedagogy. However, in August 2020, this subject was innovated a step further through self-scoring approach to encourage maximum student engagement in an online platform. As a result of the global pandemic the year 2020 had set a new precedence of complete online teaching. With this innovation, the results/feedback indicated that in fact it had not only increased the level of student online engagement, but also noted the performance and confidence of the students vastly improved. This approach has greatly quantified the engagement and student satisfaction level of this module, which was captured by the TES as well as a survey initiated by the lecturers for further research. The OGAME framework, enhancing the simulated classroom and paving the way to a possible Gamified Assessment Model which can be used for wider multidisciplinary pedagogical applications.

Content

Description of your innovation

The Online Gamified Assessment Model (OGAME) model is a fully online assessment tool specially designed for formative real time assessment progress tracking which is based on a single source of input via online individual assessment rubrics with a self-scoring system and moderated by the assessor subsequently linked to viewable self-updating achievement rankings leaderboard, Taylor's Graduate Capabilities attainment leaderboards with analytics and progress charts.

What is the context or background of the innovation / product development / design / process?

2.1 To innovate an already creative subject further was a challenge thus the infusion of the Online Gamified Assessment Model (OGAME) into the design and delivery of the subject with self-scoring for assessment. This gave students the ability to see their progress, evaluate and realign with the requirements of the assignment and project outcomes. Self - scoring was closely monitored by mentorship and consultation by the lecturer/tutor at every juncture (5 steps) by viewing of the analytics. This therefore allowed students to monitor their own progress and develop their online independent learning which seamlessly correlates to their progress. This could be viewed in their online e-journal which acts and categorized in their weightage as the e-portfolio.

2.2 To introduce students to fuse creativity via gamification in assessment delivery, thus enhancing the output. Given the pandemic online classes, with no F2F interaction, this innovation of the delivery of the subject proved to be a huge success as this innovation created and sustained interest in class work and assessments. The nature of the awarding XP points for class work tasks as well as assignments, heightened students creativity as it spurred students to strive harder as well as challenges ones capabilities, viewing their efforts as epic quests and achievements (Chou, 2016).

2.3. Group Work Dynamics and the ability to collaborate paved way for better performance among the students. With the open concept, the ability of students being able to view his/her friends work, stimulated better learning patterns and performance among students. This was also done with peer discussion for group work.

2.4. Self-scoring which led to Introspective learning; the ability to discern and evaluate their progress. This empowered students to become independent learners whether as individuals or in a group. This helped them to design and evaluate their ideas, explore their potential and make sound decisions which required mature and simulate real life scenarios. See figure 1 below which shows an extract of the students' feedback:

Figure 1: Student feedback on the self-scoring system. More data on the feedback and testimonial can be viewed at this link:
https://docs.google.com/spreadsheets/d/1kne34pPYyi_enhfazrhIgv353w-cKYXdjTBbWq2acm4/edit?usp=sharing

Why are they important to education?

This is based on current needs of all educators. The one-time input, autonomous aspects of online classroom assessments are important for not only online delivery but also for hybrid-based learning (which includes online and face to face simultaneously). The purpose is to reduce educators time on monitoring and manually documenting and calculating marks. Instead, more time can be invested into discussions, sharing, mentoring process and pastoral care for students. It also creates excitement, enjoyment and challenges the students to do better, invests more attempts and creates more purpose for introspection.

Please write any advantages of your innovation / product development / design / process towards education and community.

The findings of this approach presents many possibilities in multi-disciplinary uses and it may be possible for implementation in private and public education. The one-time input source which leads to autonomous self-updating mechanism of this model may greatly reduce educators' documentation workload.

This is greatly reflected in the Critical and Creative Thinking Skills reflective survey analytics and qualitative feedback from 119 respondents who were all students of this module.

Furthermore, the added features of the Taylor's Graduate Capability (TGC) Leaderboard to measure the attainment of the TGC domains by the students which is aligned with the assignments and projects also adds to the advantage of the OGAME model to analyze levels of attainment of the required learning outcomes.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

While The Online Gamified Assessment Model (OGAME) does present a possibility in commercialization, we are currently working towards a prototype app for all educators to customize their gamified assessment for their modules or subjects.

Acknowledgement

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BIM-BASED CLOUD COLLABORATION: EMBRACING MULTIDISCIPLINARY LEARNING EXPERIENCE IN ARCHITECTURAL DESIGN MODULE.

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Highlights: Building Information Modelling (BIM) as a collaborative tool would enable collaborators of multiple disciplines to work in shared online platform either co-located or remotely. Furthermore, multidisciplinary learning was seen as an innovative approach to learning especially in embracing the trends of IR 4.0. As the pandemic situation still occurred, this paper focuses on alternative teaching and learning experience in a multidisciplinary setting by using BIM-based cloud application as an online platform to practice efficient collaboration and integrated delivery of building projects. BIM Collaborate Pro workflow was used in the module to allow students from various background and disciplines, to collaborate in a working environment, meanwhile, to embrace the multidisciplinary learning experience.

Key words: Building Information Modelling, Cloud Collaboration, Collaborative Learning, Multidisciplinary Learning, Architectural Design.

Introduction

Background of Multidisciplinary Learning Experience (MLE) Project

Multidisciplinary learning experience is an approach to curriculum integration which emphasizes the collaboration concept across various disciplines in responding to the Fourth Industrial Revolution (4IR). The Fourth Industrial Revolution (4IR) has practically broad down the barriers within disciplines where graduates are expected to work across disciplines as fields are emerging which are no longer in the domain of one specific discipline. Now, various skills are required to fit the workforce and industry demand in the future. Education settings are also expected to be revisited in terms of delivery and accepting the knowledge to satisfy the needs of the IR4.0 job market. In the World Economic Forum Agenda 2020, the COVID-19 crisis

may well change our world and our global outlook; it may also teach us about how education needs to restructure to be able to better prepare our young learners for what the future might hold. The lessons include educating citizens in an interconnected world, redefining the role of the educator, teaching life skills needed for the future and unlocking technology to deliver education. All these are important lessons to be adopted in order for the learners to be diversified and equipped with the 10 skills expected to fulfill the industry demand. The expected skills cover complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgement and decision making, service orientation, negotiation as well as cognitive flexibility. The diversity of the complex problem solving was one of the salient teaching approaches of the 21st century where students have to apply a discipline-specific knowledge in a multidisciplinary setting from different disciplines.

This paper focuses on the multidisciplinary learning experience concept adopted in a series of modules band together within a built environment realm. The goal of the approach is to expose the students to the real-world project-based learning to enfold the 10 skills expected. Based on Malaysian blueprint 2013-2025, graduates need to be equipped with the skills of critical thinking, communication, collaboration, and creativity to be successful in the 21st century jobmarket. In response to that, there are three modules within the built environment disciplines working closely in the project-based learning initiative namely IT Application for Sustainable Design, Interior Architecture Design IV and Quantity Surveying Studio modules. The multidisciplinary learning innovation project described in this paper provides the pedagogical approach to relate to the real-world practices in the built environment field where all consultants in various disciplines are working closely in designing the boutique hotel supported by lecturers as facilitators during the project course implementations.

The module uses project-based assignments to guide the learning ahead where students from stated disciplines collaborate together in designing a boutique hotel project. Each discipline plays their specific discipline knowledge, enhancing their skills and competencies as well as their creativity to implement the project-based assignment as per client's requirement. To satisfy the needs of IR 4.0 job market and develop globally competitive learners, education 4.0 needs to develop 4 skills, namely critical thinking (i.e., looking at the problems in novel ways associating learning subjects across disciplines), communication (i.e., sharing thoughts, ideas, questions, experiences and solutions), collaboration (i.e. working together in order to reach a common goal by putting experiences, talents and smart-work together) and creativity (attempting new approaches through invention and innovation), which could be nurtured and taught, refined with the proper approach and guidance (Fadhlullah & Ahmad, 2017; Zain, Muniandy & Hashim, 2016).

In this ever-changing global environment, a real-life skill setting needs to be tailored in the delivery of projects implemented in university to enable students understanding of the multiple-discipline specific knowledge and to experience working on a multi discipline project contributing to solving a complex problem. Hence, it helps to develop the innovation competence of future professionals and broadens their lens of what the future is expected for. To establish the common understanding of the project requirement and to ease the process, the common slots in the student timetable are set to encourage communication and collaboration among parties involved between students and the lecturers. Besides the soft skills, the digital technology skills are obviously important to be explored as to ease the communication between parties and stakeholder. Indeed, the process of designing, constructing and

maintaining a building or facility requires several individuals and built environment professionals working together to achieve the desired project outcomes. Such professionals include architects, architectural technologists, engineers, quantity surveyors and construction project managers. Macdonald and Mills (2013) strongly argue that integrated project delivery employing collaboration and disruptive technologies (such as BIM) have the potential to enhance collaboration between these various groups of stakeholders and to improve efficiency in the industry (which is lagging behind other sectors, such as the manufacturing industry).

Concept of Building Information Modelling and Collaboration

Building Information Modelling (BIM) is a collaborative process to design and construction that involves integrating the various disciplines to build a structure in a virtual and visual environment (Lu et al. 2013). The module requires students to use Autodesk Revit 2020 as the authoring tool to produce 3D models and drawings of the design. The built-in functions of the software, namely 'Collaboration in Revit' enables the project team collaborators to work remotely on the design model in a single and integrated cloud-based data environment (CDE) namely BIM Collaborate Pro. The cloud platform connects each team members as well as the lecturers involved with direct, real- time interaction within project models to reduce dependency of traditional face-to-face coordination and usage of conventional tools such as email and phone. Such coordination and reviewing activities can be conducted throughout the development of the design either in remote or co-located environment.

Case Study: BIM-Based Collaboration for Architectural Design Process

The use of BIM-based cloud collaboration service for design development was driven by several challenges in architectural learning, especially during this recent COVID 19 pandemic, where the dependency of traditional hardcopy 2D coordination was very limited, thus online was the main medium of teaching and learning. Previously, collaboration among students becomes problematic when coherence and accuracy of 3D building model and drawings authoring fail to keep up with constant amendments. Mistakes in information input may occur if students are not able to keep track on the updated status of the 3D building model and drawing development. Students' work progress monitoring by lecturer is not efficient when access to the 3D building model softcopy is limited due to time and location constraints. Progress review often requires physical 2D drawing which may incur cost and time. Students may not be able to track previous review comments if documentation is not executed properly. The lack of coordination among students and lecturer appears to be the main challenge for effective work production and progress monitoring.

As shown in Figure 1, the above challenges could be addressed by leveraging the functionalities of Revit Collaboration and BIM Collaborate inclusion into the current process. Collaboration among students was made possible via Revit tools which allow real-time access to the common data (3D building model and drawings) on a network hub platform. Autodesk BIM 360 offers the convenience of Cloud Computing by providing the network infrastructure also known as the Common Data Environment (CDE) to store, reload and synchronize the common data efficiently. Furthermore, the workflow supports three (3) main elements of drawing coordination namely Collaboration, Coordination/Review and Monitoring. The documents in CDE allows students of various disciplines to interact directly to the design via web browser. This flexibility of views and walkthrough allows efficient and flexible visualization which can be interpreted from all the students from differing background. The

cloud platform also grants the lecturer access to the real-time and updated version of the common data for progress monitoring. The Document Management tool in BIM 360 serves as the web interface for coordination and progress review. Lecturers can view students' work, provide comments markups and annotations of 3D building model, and drawings can be made either in co-located or remotely through live review.
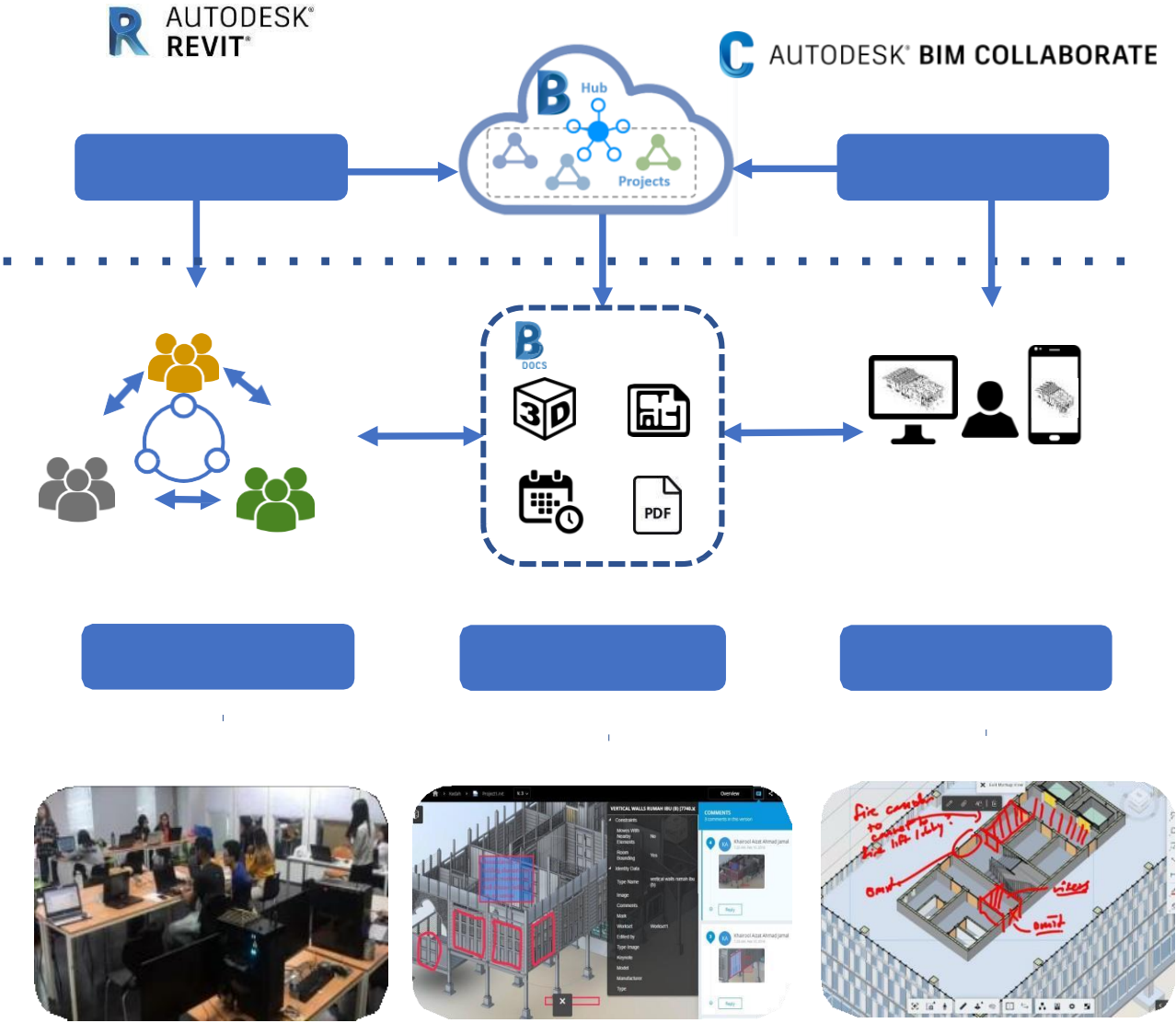
Figure 1. The BIM-Based Collaboration Workflow/Process for the Development of Boutique Hotel Design Project

The Importance of BIM-Based Cloud Collaboration in Embracing the Multidisciplinary Learning in Architectural Education.

Over the last 9 years there has been a rapid movement from computer aided design (CAD)to building information modelling (BIM) by the architects, engineers and construction managers (AEC) and this has created several challenges and opportunities for AEC educational programme (Becerik-Gerberetal, 2011). Building information modelling (BIM) is one of the most promising

recent developments in the Architecture, Engineering, Construction and Operation (AECO) industry. The term building information modelling (BIM) is an extensive, wide-ranging term that covers technologies and methodologies based around the creation and co-ordination of digital building data that is visually represented in three dimensions (3D) on a computer screen. Becerik-Gerberetal, (2011) indicate that BIM implemented into the curricula will facilitate multidisciplinary approach that consolidates effort and enables more efficient collaboration and can also provide a platform for exploring team structures and collaborations and realizing improved student outcomes. The global construction industry is witnessing a move towards a more collaborative way of working with the growing awareness of, and implementation of, BIM (Bryde et al. (2013), Zainon et al. (2016); Ghaffararianhoseini et a (2017), Vass and Gustavsson (2017) and Ozorhon and Karacigan (2020). Team learning, typical of multidisciplinary BIM education, has been seen as a way of achieving competence-based education, especially in vocational studies such as built environment disciplines. In the opinion of Wijnia et al. (2016), students' involvement in collective team learning activities are crucial to the development of the necessary knowledge, skills and competencies. Zhao et al. (2013) referred to this as BIM-enhanced team-based learning, an approach considered capable of meeting future needs and industry's expectations of new construction graduates. In other words, the incorporation of BIM into construction education is expected to improve collaboration and multidisciplinary working in the industry.

The Advantages of Cloud-Collaboration in Embracing Multidisciplinary Learning Education.

As this MLE learning initiative are currently still under progress, a survey has been conducted with architectural students from previous semester to evaluate their experience using the cloud-collaboration learning in architectural design. Most of respondents highlighted several benefits as follows:

Benefit Factors of BIM-Based Cloud Collaboration	Results	
	Mean (M)	Rank (R)
1 Improved time efficiency and speed in executing project	4.52	1
2 Enhanced and effective communication among team members	4.33	2
3 Improved drawing and better model visualization for coordination purposes	4.31	3
4 Enhanced the quality of drawings and 3D model produced	4.22	4
5 High potential to reduce risks of errors/discrepancies in drawings and model	4.18	5
6 Centralized and integrated asset of information for the project	4.12	6
7 Improved and clear understanding of design	4.07	7
8 Minimize paper-based process and collaborate digitally	4.06	8

Conclusion and Future Recommendations

Considered as a rapid and emerging technology, Cloud-BIM based technology has rapidly become a new research area in architecture, engineering, and construction (AEC) industry since year 2010 (Afsari, 2016). And at the same time, the multidisciplinary learning approach has becoming a much-needed learning trend to drive the innovative mindsets of 21st century students/leaners. Furthermore, various efforts have been made to spearhead the practice of BIM-based collaboration to Level 2 by year 2020 as well as to meet the demand of

Construction 4.0 and IR

4.0 (CIDB, 2017; CIDB, 2020). Hence, to keep up with the upcoming trend it is essential that this sustainable approach of project delivery to be adopted especially within the architectural education as currently the industry is still facing numerous challenges to adapt new technologies into practices. The cloud collaboration process will provide significant value to the students as a powerful tool in transforming the fragmented method of collaboration into an efficient and highly integrated workflow to support the process of teaching and learning in near future.

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Highlights: The global COVID-19 pandemic had rose drastic change to the largest online movement in the history of education which focus on application of the current technology to promote the blended learning and reduction of negative attitudes of learners toward technology instruments, especially in the transformation of Education 4.0. The crisis triggered an opportunity to integrate the artificial intelligence technology which shifting the practice to be more aligned to the standards and to meet the needs of all learners.

Key words: *Artificial intelligence, COVID-19, Education 4.0, Technology Enhance Learning, Educational Reform*

Introduction

The global COVID-19 pandemic had rose drastic change to almost everything to us, which resulted in the largest online movement in the history of education (Said, 2021) especially higher education, all the educators are advice to turn to online class to help engage students and support online learning. The implementation of fully online learning increases the virtual setting condition, specifically the flipped classroom and the usage of all sort of digital instruments provides educators with an opportunity to shift to innovation in curriculum (Davis et al., 2020) and craft the future of online learning. As a 21st century educator, we must be able to use the full range of digital-age tools to improve student engagement and achievement, hence open up the opportunity to integrate Artificial Intelligence technology in online learning. AI in education facilitate and inspire student learning and creativity so that all students achieve in the global society. The promotion of AI education is increasing globally and its applications in education increase (Xian, L, 2010). AI provide students a more holistic learning environment inside or outside the classroom setting with intelligent tutoring systems and technological architecture to keep pace with the fast-changing world for the education system globally (Chen, MdYunus, Ali & Bakar, 2008; Pedro, Subosa, Rivas & Valverde, 2019). One of it will be Deakin University in Australia, which collaborated with IBM was the first university in the world to implement AI: Watson supercomputer in massive open online courses, set as an example of the future impact of AI in higher education (Popenici & Kerr, 2017). Followed by Technical University of Berlin began using computer chatbot called Alex which helps students to plan their courses in 2015. Thus, AI has emerges as a pivot in the educational market internationally as many technology giants such as Amazon, Google and Facebook invest millions of dollars in AI products in education and Chinese giants such as Lenovo, Huawei, Alibaba, Tencent, as well as other companies also interested in it (Osetskyi et al, 2020). It proven that AI as the latest technology could act as a "platform or medium" to help teachers as mentors and build new and innovative ways of teaching (Leong and Latif (2018) to provide authentic experiential learning opportunities for students at "HOME".

The principles behind this pedagogy comprise of a the mix of AI Technology, Virtual Space & Learning together in innovative ways that support a variety of "E-learning" mode to facilitate knowledge transfer - Interactive lesson, Interaction "Machine" collaboration and Independent self-

pace learning that enable learning anytime, anywhere and stay connected 24/7 without boundaries. AI-aided education includes intelligent education, innovative virtual learning, and data analysis and prediction (Chen, Chen& Lin, 2020) with the major concerns of education sector is looking for ways of how students can learn most effectively and efficiently

As a fact that the engagement of AI is more prevalent in education today, the employment of AI technology address the needs to empower student to find out, to explore and to build their own knowledge throughout the learning journey. In addition to that, the Sensory AI technology helps students become fluent in using digital media to express themselves and leads to creative learning. Apart from that, integration of AI and education will open up new opportunities to vastly improve the quality of teaching and learning (Hwang, G. et al., 2020) and amplify active learning experiences.

Content

The implementation of AI technology in Innovative Media Module arose to meet the target "ONLINE LEARNING" during lockdown period in spite of equip students with the characteristics and skills that will help them live in this ever-changing technological world. As an 21st Century Educator, it is essential to be able to implement technology, think forward, embrace change and have the ability to allow students learn best when they are taught to their own unique style and ability.

It's a delighted support from Durairajan Ramachandram (Manager, End user Computing, Taylor's University) to furnish the vLab and vApps (remote access from home that enable students to logon to the software online without stepping into the campus) that enable them to enjoy the AI technology at "HOME", locally and internationally. The objective for this module is to introduce students to the different dimensions of digital media to deliver basic technical skills in current digital media technology and practice. One of the project/ assignment require student to develop and produce Animation. We use AI technology to expose them to Animation ideas, theories and insights related to current AI technological media (to create interactive vector animations that combines live motion-capture with a multi-track recording system to control layered 2D puppets drawn in Photoshop or Illustrator) through the subject's exploration of the creation, consumption and sharing of new ideas of how AI technology changing the landscape of the animation industry.

The use of Artificial Intelligence as a tool to facilitate learning is becoming an increasing practice where educator should prepare and evaluate students' ability to acquire meaningful learning experiences through AI technology. Most students are visual learners which remember best in what they see - pictures, diagrams, time lines, films, demonstrations (Felder & Silverman, 1988). Their brains are "wired" differently than older people (Ngatirin& Zainol, 2020) hence the way they process information also different in a randomized or networked pattern which allows them to build concept maps (Baker, Matulich, & Papp, 2007). This explains why students become disinterested and disengaged very quickly when they are asked to sit through a traditional 50-minute class involving lectures only (Baker, Matulich, & Papp, 2007). AL technology enables formation of a learning space built for active learning. The adoption of this new pedagogy provide advantages that embedding new skills in students, teaching them how to solve problems, to be more creative with "machine" collaboration. This learning space has allowed us flexibility to explore and to build their own knowledge and adapt individual differences in a development of a

holistic curriculum with the opportunity for openness to experience – to summon curious, intelligent, and imaginative among students for their learning path.

Important to education

Integrating AI technology into learning mandates flexibility and activity-based space planning, where it is now take place in classroom without wall, supporting richer E-interactions and higher-level cognitive learning. Within the AI technology learning environment that support the coexist of self-directed work at both web based as well as collaborative tasks in creating a new behaviors of learning that are the direct result of new technologies. As mentioned by Jain (2016), "Don't Teach Me, Let me Learn", it is the learning style that preferred by millennia's. We should emphasis on Rigorous learning. Rigor means framing lessons at the high end of the knowledge Taxonomy (Analyzing, Evaluating & Creating) that facilitate the opportunity for every student to learn in innovative ways that is engaging, enabling them to reach their full potential and develop skills that will help them thrive in the future.
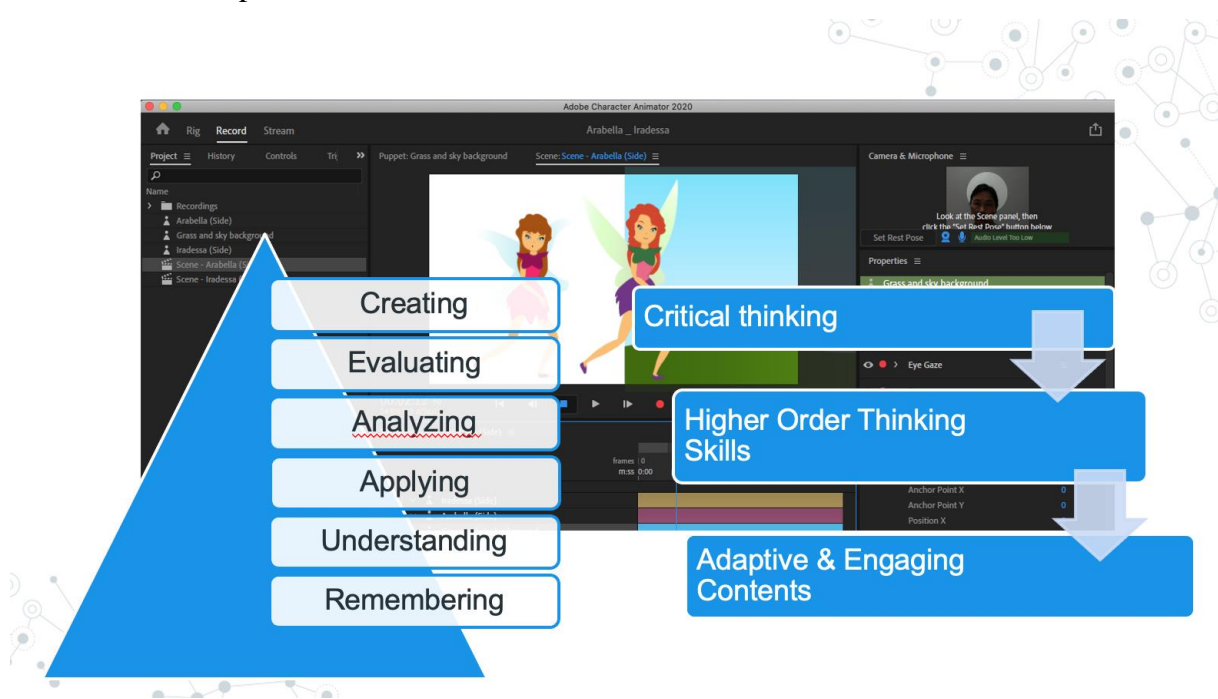
Pic 1: Framing lessons at the high end of the knowledge Taxonomy (Analyzing, Evaluating & Creating) that facilitate the opportunity for every student to learn in innovative ways.

A total of 190 individuals had participated in a remote survey during the submission of their animation assignment to gauge the feedback of the perception of the adoption of AI technology. The survey usability rate of 90% was achieved using a convenience sampling which is the students (year one, semester two) who attended Innovative Media Module.
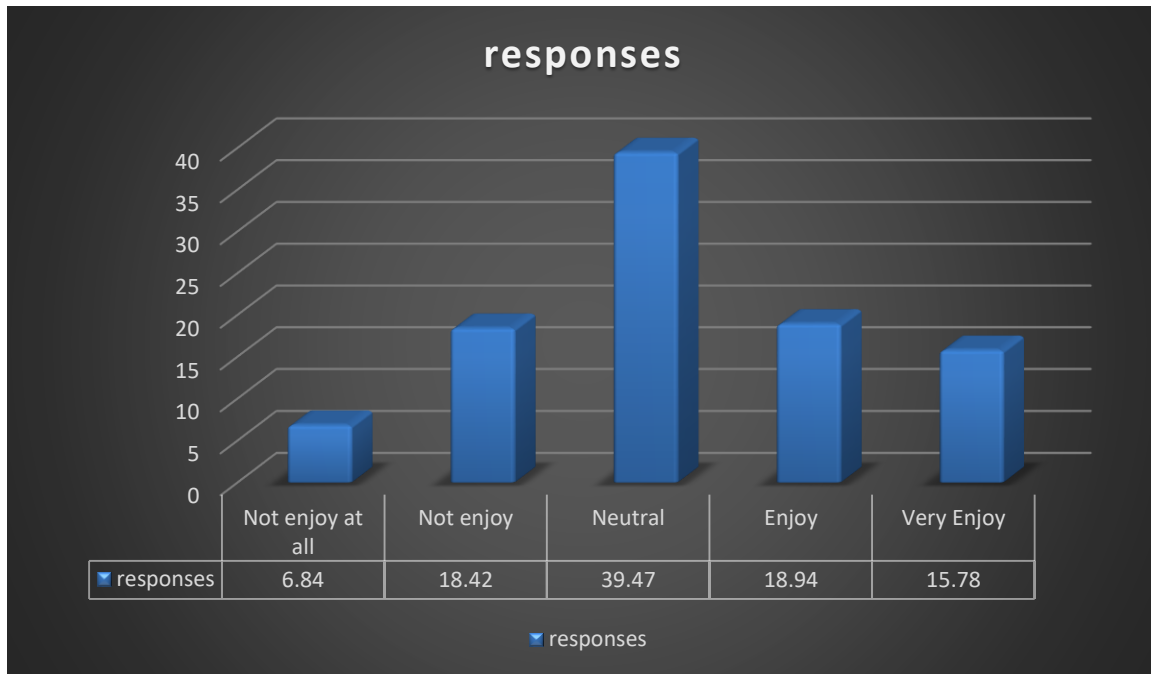
Diagram 1: Perceived of Enjoyment – Perception toward adoption of AI technology (from Not at all to very enjoy).

The chart show that most students enjoyed the AL technology in class that were 34.72% of the students (March and August semester) enjoy the AI adoption, where only 25.26 do not enjoy the technology and 39.47 stay neutral toward the adoption of AL technology. This feedback showed that students are in the early stage of adoption of new AI technology to amend their cognitive structures, learning attitudes, in developing new skillset. Here are some POV of students that used AI technology to develop their animation assignment.

Diagram 2: Point of View – Perception toward adoption of AI technology

Overall the data showed that the perception of students toward the adoption of AI technology were seems fine at the early stage where the number of neutral showing rooms of acceptance toward this new technology that lay the potential for future online learning that triggered by pandemic crisis.

With the AI technology, the students are actively engaged. The AI technology comprise of a mix of AI Technology, Virtual Space & Learning together in innovative ways that support a variety of "E-learning" mode to facilitate knowledge transfer - Interactive lesson, Interaction "Machine" collaboration and Independent self-pace learning that enable learning anytime, anywhere and stay connected 24/7 without boundaries. Students achieve a new awareness for the actual AI technology that help to develop new skillsets, and how "machine" collaborate to develop their animation assignment by show the attributes that make the ideal of learning and develop more interests and engagement among students, making the learning easy to a higher level.

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DESIGNING EFFECTIVE LANGUAGE MODULE USING THE GAGNES NINE EVENTS OF INSTRUCTION MODEL

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Highlights: Education is one of the fields that was affected by the COVID-19 health crisis and faced a unique challenge of educating the learners without classes. Many schools and educational institutes have adopted online learning while many more struggled to conduct lessons due to poor facilities and lack of connectivity. Nevertheless, educators around the world strived to achieve their goals by various means. This e-Learning module design adapts Gagne's Events of Instruction model to plan and execute effective and systematic lessons in both synchronous and asynchronous classes. The nine events are successfully integrated into teaching the online module in a clear and consistent manner throughout the semesters.

Key words: events of instruction model, instructional design, autonomous learning, foreign languages

Introduction

Covid-19 had brought a major change to the education sector and the way classes are conducted without being in a physical classroom. In the beginning of the lockdown period, the education system in most countries were struggling to conduct classes via remote options like online teaching, and television-based instruction. While the situation improved in many places, it is evident that teaching and learning processes in educational institutes were heavily done in a traditional manner with little adaptation to the fast-changing internet connected world. On the other hand, the pandemic also brought upon the much-needed change to upgrade the education system in many countries. Educators and learners alike have embraced the technology and changed the way they teach and learn, by adopting numerous new apps and tools to teach that are freely available on the internet. Daniel (2020) posed a question regarding curriculum that educators should be using during the pandemic?

According to Cahapay (2021), the education systems' immediate concern is the instruction during the pandemic which involves lesson objectives, topics, teaching strategies, and assessment tasks. He also states that recent discussions regarding education mostly revolves around challenges and opportunities found in remote learning while processes involving instructional designs are disregarded. Cahapay stresses that the process of instructional designs should be emphasized in planning remote teaching to have better responses and to improve teaching.

This paper discusses the adoption of Gagne's nine events of instruction model in beginner level foreign language classrooms at Taylor's University. The modules were conducted fully online via Taylor's learning management system, TIMeS. Synchronous and asynchronous lessons were planned and delivered through TIMeS and Zoom platforms. The modules were planned in a systematic and consistent manner to align the learning objective, teaching strategies, and

assessment tasks. The following Table 1 shows Gagne's model adapted to suit the needs of the foreign languages taught at Taylor's University for both synchronous and asynchronous learning methods. The processes of these instructions are followed as per need basis and sometimes it is necessary to skip a step or to combine steps in order to make the lessons more meaningful to the students and to make sure their learning needs are met.

Students are first directed to the TIMeS learning portal at the beginning of their semester, in which they are given introduction to the lecturers and instructions on the module and learning apps involved. In synchronous classes conducted via Zoom application, students will each week be greeted and have brief conversation with the lecturer to gain their interest in the session itself. Lessons will begin with informing objectives and learning outcomes and followed by recalling previous week lessons. Depending on the topics or learning outcomes of a particular topic, students are either presented with the learning material/topic of the week, instructed on the activities, and encouraged to participate in them. Feedbacks on students' performances are immediate and lecturers always encourage them to practise more after the lessons. Asynchronous classes are similarly structured, but instructions are pre-written in the systems and feedbacks are also automatic based on their performance.

Table 1: Adaptation of Gagne's Nine Events of Instruction Model in language in classroom

Gagne's Model	Synchronous learning	Asynchronous learning
Gaining attention	• Being available for an online live session on time & chat with students before starting lesson.	• Use of restriction, colourful labels and infographic grammatical points to capture students' attention.
Informing the learner of the objective	• Informing of lesson objectives and learning outcomes.	• Informing students of the topic discussed for a lesson and number of activities they will be attempting with clear written instructions.
Stimulating recall of prerequisite learning	• Requesting students to recall words and phrases learnt previously.	• Giving a short quiz for the previous topic's vocabulary.
Presenting the stimulus material	• Informing students what will be learned/discussed on that day.	• Providing pre-recorded instructional videos and exercises upon a completion of previous activities.
Providing learning guidance	• Informing students of the steps needed to be followed.	• Providing examples to use grammatical points and vocabularies correctly to meaningful phrases.
Eliciting the performance	• Requesting students to provide answers and read aloud sentences or text.	• Encouraging students to do the activities multiple times if they do not achieve passing grade required
Providing feedback	• Correcting pronunciation mistakes and asking students to repeat words correctly • Discussing and explaining answers	• Providing feedback in timely manner

Assessing the performance	• Providing feedback to students' scripts • Providing time to speak and read their scripts	• Requesting students to attempt to write their own script.
Enhancing retention and transfer	• Encouraging them to practise their language skills.	• Re-introducing previous topics exercises. • Encourage using simple or favourite phrases in daily life such as social media.

Through the applied instructional model, learners and instructors can continuously monitor the learning process and motivate learning. With Moodles, a student's learning process can be visually exposed through its features such as 'completion bar'. All students have the unlimited chances to try and re-do any activities in order to encourage them to learn effectively and autonomously. It reduces learning anxiety, but increases individuals' sense of achievement and satisfaction even at different stages of instructional events. At the same time, it allows them to see in which areas they need revision or assistance from instructors. It enables them to improve language skills in terms of spelling, pronunciation, speaking as well as reading comprehension.

As the demand and significance for self-development is recognized as important for the crisis after pandemic, various forms of online courses are welcomed not only by students but also by adults and employees. This instructional design can be easily applied on any Moodle-type platform and not significantly affected by the nature of the educational institution or the duration of the course. Considering these advantages, it can be used in different disciplines, not limited to foreign language teaching and learning. The question of how to present and deliver learning content, how to monitor learning activities, and how to continuously inspire individual learners' learning engagement and learning motivation is important for all levels of learners, regardless of the field.

Educational institutions and managers also can promote and offer short term courses to learners who want to develop skills in a particular field of interest. They also can acknowledge these learning achievements by issuing certificates or badges based on the learners' performance. The institutes may also consider to utilize this instructional design in the form of a game or mobile app, considering the learner's age or characteristics of the course. It permits to increase learners' participation, diversify their learning tasks through games or quizzes, and bring about better and immediate responses in learning.

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INTERACTIVE VIRTUAL LEARNING USING CLASSPOINT

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Highlights: On 18th March 2021, all new tertiary students embarked on the biggest leap in the history of education where all teaching and learning had to take place in a borderless environment. The new journey to the remote learning raised trepidation amongst the law students particularly the new students entering their first day of university life on an online platform. Lecturers have shared their struggles to teach virtually due to various constraints such as students not switching on their webcam, students are not motivated to learn online, difficulties to teach critical and analytical skills, no engagement or interactivity in online classes to name a few. Hence the authors for this project had adopted the use of ClassPoint as an initiative to innovate the delivery of law modules in online classes.

Key words: Virtual Learning, Online Learning, Remote Learning, Borderless Environment, Law modules, ClassPoint, interactive

Introduction

The world of work is changing – and some jobs are changing faster than others. In 2018, the World Economic Forum has produced a report that lawyers are amongst list of professions that will be made redundant in the future (World Economic Forum, 2018). In 2020, the World Economic Forum has published a report containing unprecedented granularity of the future skills that are needed for the future world of work (Whiting, 2020). The future skills include analytical thinking, innovation, active learning and learning strategies, complex problem solving and critical thing amongst others. As the world is changing so rapidly, law lecturers are faced with the most challenging task to ensure that the law students are equipped with future skills in spite that teaching and learning are conducted online in times of COVID-19 pandemic.

Hence ClassPoint was adopted as one of the latest innovative tools to deliver law modules online in order to overcome the common challenges faced by the legal educators. A research was conducted to assess the effectiveness of the adoption of ClassPoint in Year 2 August 2020 students at Taylor's University and it was found that ClassPoint improves law students' analytical thinking skills, creative and critical thinking skills. The law students also felt that ClassPoint improves their abilities to be innovative and it also enables them to use their imagination. The research also reveal that ClassPoint develops law students' evaluation and reasoning skills. Overall, the law students enjoyed the use of ClassPoint as it does increase their interactions within the scope of the borderless learning environment.

Questions	Percentage of those of strongly agreed/agreed	Percentage of those who were neutral	Percentage of those who strongly disagreed/disagreed
I feel using ClassPoint in virtual class improve my analytical thinking skills	53.4%	18.3%	28.3%
I feel using ClassPoint in virtual class develops my analysis skills	51.6%	21.7%	26.6%
I feel using ClassPoint in virtual class improve my critical thinking skills	53.3%	25%	21.6%
I feel using ClassPoint in virtual class develops my reasoning skills	55%	25%	20%
I feel using ClassPoint in virtual class develops my evaluation skills	60%	20%	20%
I feel using ClassPoint in virtual class improve my creative skills	48.3%	25%	26.7%
I feel using ClassPoint in virtual class improve my abilities to be innovative	53.3%	23.3%	23.3%
I feel using ClassPoint in virtual class enables me to use my imagination	36.7%	38.3%	25%
I feel using ClassPoint in virtual class develops my willingness to learn	70%	13.3%	16.6%

What is the context or background of the innovation / product development / design / process?

President of the Malaysian Bar, Mr. Salim Bashir made a press statement that given that legal skills evolve with the course of time, so too should its education and training therefore traditional law schools must therefore provide a legal education that consists of crucial skills such as creative solutions to solving legal problems (Malaysian Bar, 2020). He emphasized that law school curricula must be tailored in such a way to avoid merely regurgitating legal principles in examinations without actually understanding their practical applications.

In light of COVID-19 pandemic, all final examinations had to be conducted online. Since the Movement Control Order lasted until the end of March 2020 semester, the students were provided with an alternative opportunity to sit for the final examinations remotely in a borderless environment platform. As much as the new format of assessment intends to ease the students to sit for their online final examination, it has a drawback where it provided an avenue for some students to regurgitate answers from the Internet sources, going against the very principle shared by the President of the Malaysian Bar.

Hence the adoption of ClassPoint during lectures to develop students' core skills (Taylor's University, 2021) and also future-needed skills such as resilience, stress tolerance, creativity, initiative, problem solving skills, active learning, ideation (World Economic Forum, 2020) despite teaching and learning are to be delivered online.

Why are they important to education?

The President of the Malaysian Bar emphasized that it is insufficient for law schools to focus on the law students' academic qualifications but law students must also acquire the future skills so that they can thrive in their future job market (Malaysian Bar, 2020). Law lecturers hold the responsibilities not only to impart knowledge but to stimulate effective delivery in the classroom. In times of COVID-19 pandemic, all lectures are faced with various challenges to make the virtual learning to be interactive and engaging but at the same time, the law lecturers need to be creative and innovative to make virtual learning to be meaningful for the students.

Hence the delivery of law modules using ClassPoint has proven to be able to increase students' learning experience in making them to be more motivated, inspired and confident to learn law remotely and virtually. In fact, the adoption of ClassPoint in virtual class will result in students to be receptive in using technological tools to learn law which is a skill in itself. When students feel stimulated and interested to learn law virtually, the positive mindset and attitude play an important role in students' growth as the it allows the students to appreciate social closeness in an online platform.

Please write any advantages of your innovation / product development / design / process towards education and community.

ClassPoint provides a landscape for students to challenge themselves in learn law in a virtual platform. Students would experience the first encounter of difficulty to learn remotely but with the interesting features of ClassPoint, students will be able to continuously feel inspired and motivated in their journey to learn law online. Students will also be able to embrace new learning techniques which is a crucial skill for future lawyers to be adaptive and receptive to change. In turn, this skill will ensure that the law students are equipped with the future soft-skills that will prevent them from being completely automated by artificial intelligence.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

The use of ClassPoint is not a mere engagement tool or a gimmick to get the students interested in studying law virtually but it encourages students to explore, experience and innovate (Lawrie, 2017). ClassPoint does not require any special IT skills from any educator but it is very easy to use for any lecturers who are advocate of using PowerPoint slides in class. ClassPoint is a plug-in for Microsoft PowerPoint enabling educators to use their available lecture slides to digitally transform teaching and learning (ClassPoint, 2020). The features of ClassPoint include virtual pen, highlighter, laser pointer, the variation of drawing boards such as whiteboard, blackboard and chalkboard, multiple choice questions, short answers, polling, image upload, slide drawing, word cloud, pick a name and leader board. Educators may choose to embed multiple choice questions on the lecture slides itself to assess students' level of comprehension during lectures and also as a recap strategy before starting on a new topic. ClassPoint has an innovative feature of leaderboard which can capture students' performance in virtual class. ClassPoint has variety of packages which includes a free download for any lecturers from any disciplines to use ClassPoint. Alternatively, educators can subscribe to Premium packages and receives 10% discount for lifetime subscription by using coupon code: AMPSA01.

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TRAINING DESIGN OBSERVATIONAL SKILLS IN ART DIRECTION WITH VIDEO GAMES

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Highlights: The module Art Direction explores the practices of establishing consistent and effective visual aesthetics for creative outputs. To fully grasp the breadth and importance of this matter, students were to observe the applications of design elements by playing video games to formulate art direction strategies for their selected game. They were to assess the games from all visual viewpoints as both designer and player to build a cohesive case for their design re-work study. This paper examines the effect of playing video games to train students' observational skills and analysing competencies for art direction works.

Key words: Observation skills, art direction, video games, design process

Introduction

Design is a wide interchangeable concept, and its meaning and application can greatly differ from one field to another. Designers as creators in return, need to constantly innovate to be able to create artworks and creative outputs that connect context to the audience. Marc Brunet (2021), Founder and CEO of *Cubebrush*, considered observation as the single most important skill for design professionals to harness and design students to master. Training design students to observe builds empathy to the subject matter and their audience, thus allowing students to view things differently from others especially when it comes to the presentation of the visual forms. Students must be able to differentiate effective visuals to poorly constructed ones and able to translate the findings into a more effective design output. Studies have shown that strong observation skills were linked to greater creativity, originality, and flexible thinking and that people with such robust skills, whether inherent or learned through extensive training, showed superior creativity (Observation skills may be key ingredient to creativity, 2014). This is especially important in the module's learning outcome for Art Direction because to design an effective art direction is more than just combining sets of design principles to create pleasing aesthetics, but it is also to create a representation of cultural significance and to generate emotional reactions from the audience. Therefore, making observation as an essential skill for design students to master.

Even though art direction is applied across various types of creative works such as advertising, animation, film and interactive media, the module's delivery concentrated on video games as the main medium as its design structure encompasses all forms of visual functions into one output. In a single video game, players can experience visual narrative, conceptual designs, user interface (UI), and animation sequences. This allows students an opportunity to exercise their observation skills because by playing the games, the students were not only acting as an inquisitive designer but also as a player with the intention of enjoying the game. The combination of both experiences heightens their observational skills as students can compare and reflect their findings in both views to formulate a better new art direction strategy based on the games that they had played.

Description of your innovation / product development / design / process.

Students played different selection of video games ranging from retro classics such as *Tetris, Metal Slug: Super Vehicle-001, Mega Bomberman* and *Pokemon Blue and Red*, via online emulators, to observe and analyze the good artistic style of the games that made the titles as memorable masterpieces. Students also repeated the same process with free indie games downloaded from Steam, an online game platform, but this time to observe and analyze from the angle of poorly designed and problematic artistic articulation in video games.

The repetitive observation process of examining good and poorly designed art direction helped to train students to actively look at various types of design applications, needs, effects and challenges in the video games. Suri and Hendrix (2010) identified observation as the very first phase of the design process because it is critical for designers to experience what the audience see and feel. This enabled designers to empathize and understand the purpose of the output and to identify patterns, pain points and places where it can be improved.

The observation findings are then compiled as a reflection study to propose a better art direction strategy for their final project of re-working on the visual aesthetics of an existing game.

Graphic design breakdown for *Metal Slug: Super Vehicle-001* title screen. Here students observed visual hierarchy, color scheme and application of typeface in the design.
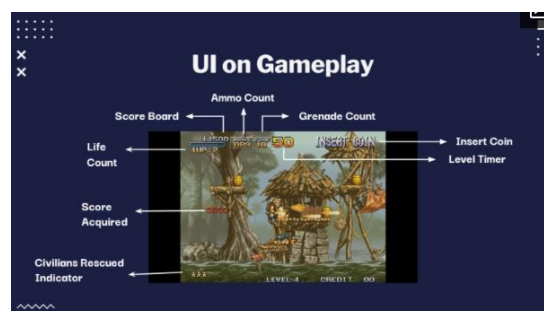
Breakdown analysis of the UI components and functions in the game, along with the understanding of the game mechanics and playability. This helped students to recognize the look and feel of the game.
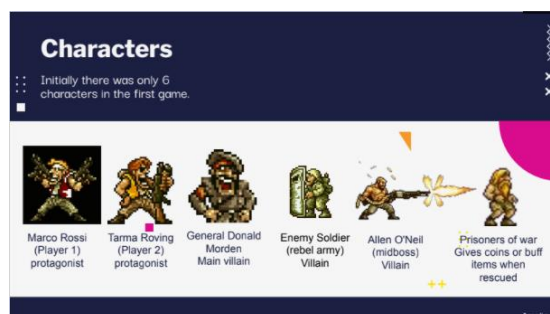
Excerpt studies of the conceptual art for the characters and environment designs for each level in the game. Here students observed the translation of narrative into visual sprites and scenes.
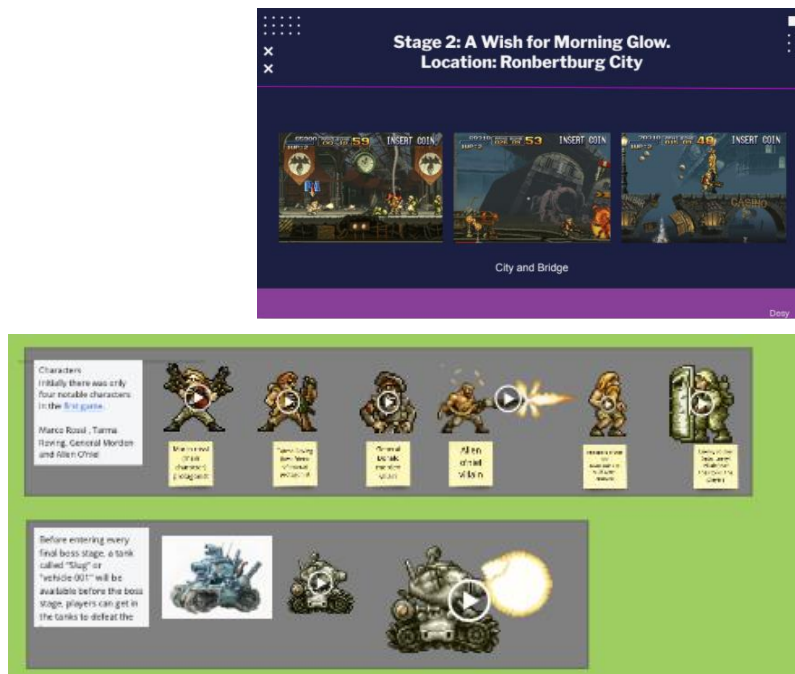
Some of the animation sequences analysis from the game. Students were able to analyze the looping animation techniques, visual effects, and characters action in motion.

Figure 1

An example of good art direction observation compiled into a reflection study.
From student's e-portfolio blog, by Desy (2020)
(https://desy0803.blogspot.com/2020/12/art-direction.html)

What is the context or background of the innovation / product development / design / process?

Kolb's Experiential Learning cycle (1984) consist of a continuous four-stage process where learners are encouraged to acquire knowledge from experiences for them to be able to create and implements ideas for improvement. The learner should be willingly active in the process so that they would be able to reflect on the experience and use analytical skills to conceptualize the experiences using decision making and problem-solving skills. The applied process in this paper consists of a linear four-stage development instead of the original continuous cycle. Students are to acquire knowledge from their playing and observation experiences to formulate better art direction strategies for the re-work design project.

Adapting to Kolb's model, the act of playing video games while conducting observation is placed in the *Concrete Experience* phase as the students' central awareness. By actively engaging the students to play and observe through this phase, students were able to analyze the use and functions of design principles in a visually comprehensive manner as well as experience the video game from the viewpoint of a player.

Typical video game's artistic structure offers more than just visual narrative. Students can observe different forms of creative specialization in real time from graphic communication studies of logo design in the title screen and typography selection; the layout of UI, icons, and controls arrangements for an interactive medium; the application of animation sequences and cinematographic cutscenes from film and media studies; and the conceptual art translation in entertainment design with the characters and environments set. This is an advantageous setting for students to exercise their observation skills as designers while also experiencing aesthetics as

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players. This establishes the empathy links between the creative outputs; in this matter from the video games; to the audience.

With *Concrete Experience* phase completed, students reflect on their experiences in the *Reflect Observation* phase and compile the good and bad art direction findings into a report. The report then served as groundwork for them to generate new ideas and suggest a much-improved art direction strategy in the *Abstract Conceptualization* phase for their video game re-work design. The students then created the new art style in the *Active Experimentation* phase as final stage of completing the project altogether.
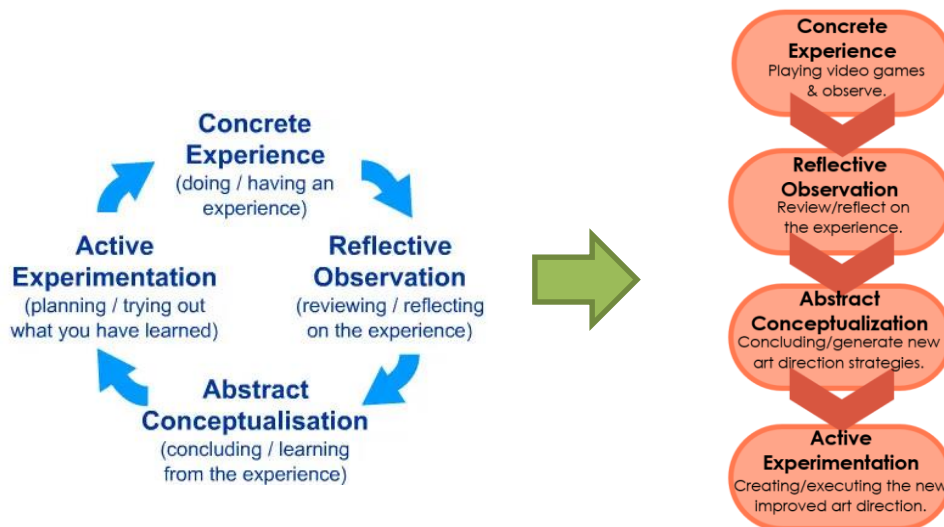
Figure 2
Adaptation of Kolb's Experiential Learning Cycle (1984) into the applied design process

Why are they important to education?

The learning process for visual design education is more than just understanding the importance of design principles and the appropriate application of these standards into graphic driven outputs. Good designers' perceptions reflect an awareness to the physical surrounding, cultural and metaphoric relationships and these observations allow designers to channel their artistic creations that connect and communicate with the audience (Suri and Hendrix, 2010). By training students to be acutely aware even to the smallest details add up to the creations that are meaningful and memorable. Contemporary design practice is already seeing a shift towards collaborative models where various experts and stakeholders work together to address multifaceted issues (Tang, Vezzani & Eriksson 2020). This is very relevant not only to art direction studies, but also to the study of design in general and specializations where students are trained to be multi-skilled designers, capable of handling different constructions and output expectations of the artworks.

Please write any advantages of your innovation / product development / design / process towards education and community.

The final project output which consists of a re-work design for an aesthetically challenged video games showcased significant improvements in terms of visual designs, art direction strategy and

thoughtful ideations. Students placed great emphasis on players' needs and applied design considerations as not to affect the video games original narrative and game play.

The feedbacks gathered from students' online e-portfolio blogs also remarked favorably over this module's approach of using video games as the main medium for the observation training. They felt that they now understand what art direction entails to and how different design principles functioned together. They also found themselves to be more observant, motivated, and considerate in their tasks.

> "... this module helped me to be more observant as a designer. In the earlier semesters, we were taught about design principles which was very useful when doing the projects. Most of us have improved in our design skills which made me feel motivated."

> "... I (felt) like art direction really build my sensibility more as a designer, in addition this module also (made) me more observant in the little thing that may be impactful if done thoughtfully."

> "I found that art direction is one of the (modules) that really help to not only focus on a design base on the layout, color, and style. Just like other design modules taken in the past semesters, (design consistency is) always the key in maintaining a quality (output)."

One student also commented positively on being encouraged to play and observe video games for their research as she remarked that it helped her find new appreciation in the hard works involved into making one.

> "This module felt like almost a break from everything because we got to play/research games and even redesign one. Overall, I think it was a fun and new experience because I got to see the details I would have never noticed if I (were) just playing a game. Knowing how much time and effort it takes just to design a game, I surely appreciate my (favorite) games even more now."

Others also commented that the approach was fascinating and had taught them to be better problem solvers as well as enforcing the importance of visual consistency in design when working together in a group.

> "The overall experience is quite intriguing… It has really taught me how to identify problems or issues and come up with solutions to further enhance or solve the problems within the game."

> "... I also learn to work better in a team and learn about the importance of teamwork and adjusting different kinds of art styles between teammates to look like one."

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SERIOUS GAME DESIGN FOR ENHANCED STUDENT ENGAGEMENT IN ONLINE ARCHITECTURE EDUCATION

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Highlights: The innovative project Gaming the Goals using the Serious Game Design (SGD) approach was an assessment for an architecture module of technical nature during COVID-19 lockdown online learning. The project was designed to engage students in learning and to impart content knowledge of the technical module through creative experimentation and designing process. The SGD was adapted as an approach for the assessment component to encourage students to explore and understand information using fun and engaging elements. The SGD is fundamentally based on the theory of constructionism. It is used to impart skills, knowledge, and attitude or to deliver information using the fun elements to engage learners. This SGD project is not common in architecture teaching and learning; however, it was adopted with careful consideration ensuring the outcomes of assessment are met. Using the SGD approach students designed and developed physical and digital games that are interactive, interesting, and impactful as educational tools to create awareness and of the global Sustainable Design Goals (SDG) among primary or secondary school students. In developing the game, the students researched and understood the goals themselves and how it is associated to built environment, achieving the module learning outcomes (MLO). The developed game will be shared with the schools to be used as teaching tool to create awareness of the SDG goals among the primary and secondary school students in Malaysia.

Key words: - Serious game design, Online Learning, Architecture, constructionism theory, educational tool

Introduction

COVID-19 is arguably one of the most disruptive pandemics in recent years to afflict our societies in general, and to higher education in particular. The spread of COVID-19 has forced millions of students and teachers to move their communication online. The movement control order (MCO) caused major disruption to higher education as all universities and higher education institutions (HEI). As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. In the case of Taylor's University a Private Higher Educational Institution, the transition of teaching and learning from physical practice to on-line learning was smooth and successful because all modules have embedded blended learning, with implementation of on-line learning or e-learning contributing to at least 30% of the class conduct. As for the Architecture school the challenge is student

engagement when teaching and learning of architecture modules were conducted hundred percent online. Therefore, this teaching and learning for the Sustainable Design Policies and Regulation a technical module adopted online learning mode adopted SGD pedagogy to enhance student learning experience particularly student engagement and motivation.

The SGD is based on the theory of constructionism. Constructionism as a theory refers to learning, where learners create socially meaningful artefacts (Ackerman, 2001). Constructionism highlights the importance of learning to learn and making things. In Constructionism the learning is necessarily situated and pragmatic. In other words, the situated nature of constructionism allows "individuals develop their ways of thinking in given situations and nonetheless remain excellent at what they do" (Paper & Hare, (1991) in Ackerman, 2001). In constructionism classrooms, incorporates project-based learning, problem-generation and problem-solving approaches, and inquiry-based activities where students generate driving questions, generate potential solution strategies and digging into investigations. The teacher's role is critical as a facilitator, educator, and co-investigator. Constructionism leverages the student's natural curiosity about the world and how things work. Their engagement is invoked through respect for their current knowledge and real-world experience. Their hypotheses and investigative methods are honoured and honed.

In this SGD project, students were required to develop an educational game that could be used to create awareness of SDG goals and targets among the public particularly primary and secondary school students. In constructionist gaming approaches, namely, those approaches in which games are designed by students (rather than professionals) for learning benefits. In designing and developing the educational games the students employed academic content knowledge such as sustainability to create practical games that are intended first and foremost for public rather than tutors. Learning in this context is a constructionist process, which also encompasses aspects of collaborative learning in which knowledge creation emerges through discussion and negotiation between individuals and groups.

Content

Description of your innovation / product development / design / process.

The module, Sustainable Design Policies and Regulations, is often taught using the lecture, site visit and tutorial mode resulting in an outcome of report. However, this method often fails to engage and entice students. Furthermore, with current pandemic situation of (COVID19) which affects the student's safety, moving to fully online learning, the student engagement was a concern in this technical module. The Serious Game Design (SGD) project was opted as the innovative solution. SGD proved to engage students in learning and to provide understanding of the module content through creative experimentation and designing process. Using the SGD in teaching sustainability in architecture provided a platform for students to explore and understand information using fun and engaging elements. The outcome of the assessments also shows that SGD can impart skills, knowledge and attitude or deliver information using the fun elements to engage learners. SGD for educational purpose works on addressing the engagement issue by using the fun factors to immerse learners in an active learning environment and pushing learners to compete and overcome challenges by actions with immediate feedback (Lameras et. al., 2017).

The continuous assessment in this module was for students to design an 'educational game' to create the awareness of the 17 Sustainable Development Goals (SDG) and it's 169 targets among public which, is aligned to the module learning outcome. The built environment is described as a critical area for the achievement of the SDGs due to the impact it creates in various categories of SDGs. The SGD was a great educational tool to start the awareness and conversation on how we can contribute to a sustainable world. This was a group work with peer evaluation and lecturer's

moderation. As the first phase of the project the students in groups of 4 or 5 was required to illustrate and familiarise the SDG goals assigned to them up in the form of comic. In this exercise, the students demonstrated that goals and targets are easily understood. To understand the goals, they also need to further research and understand current issues locally and internationally. This provides an opportunity for students to explore current pressing issues mainly associated with environment and built environment. Data and information used for every single SDG must be researched and taken from reliable sources. Next, the students were required to brain-storm on how to create the awareness of the Global SDGs to public such as school children of different age, youths, adult's campus community using an "engaging and interactive educational game". The developed game must be interactive, interesting, and impactful and can be either digital or physical. In developing the game to be used by any end user they were also requested to provide details of the game for instance how to play the game, why play the game, who is the game for, how to use the game, etc. Students were also encouraged to explore the available technology in designing and developing the SDG educational game.

Students participated actively in all the activities eg. as well as brainstorming of design ideas, solving issues, exploring digitals game design platforms which is new to them (self-directed learning), creating QR codes, publishing of the games and the manuals in websites (their own effort not part of requirement). The students also submitted a hard/physical copy of the designed game in professional quality. The students also created animation videos of how to play the games as an addition to the required printed manual. Throughout the online tutorials and discussion, the students listened to feedbacks from tutors and peers and responded to improve on the game design.

2. What is the context or background of the innovation / product development / design / process?

The SGD is based on the theory of Constructionism. Constructionism as a theory refers to learning, where learners create socially meaningful artifacts (Ackerman, 2001). Constructionism highlights the importance of learning to learn and to making things. Learning is necessarily situated and pragmatic. In other words, the situated nature of constructionism lets "individuals develop their own ways of thinking in given situations and nonetheless remain excellent at what they do" (Papert & Harel, 1991). In this project students create 'the educational game" to create the awareness of SDG goals and targets among public. In constructionist gaming approaches, namely, those approaches in which games are designed by students (rather than professionals) for learning benefits. In designing the "educational games" the students employ academic content knowledge skills such as sustainability to create practical games that are intended first and foremost for their peers/public rather than tutors. Learning in this context is a constructive process, which encompasses aspects of collaborative learning in which knowledge creation emerges through discussion and negotiation between individuals and groups.

The SGD engages student in learning and at the same time provides better understanding of the module content through creative experimentation and designing process. It imparts skills, knowledge and attitude or deliver information using fun elements to engage learners. SGD for educational purpose works in addressing the engagement issue by using the fun factors to immerse learners in an active learning environment and pushing learners to compete and overcome challenges by actions with immediate feedback (Lameras et. al., 2017). The intrinsic approach ensures that domain content and game are naturally embedded or tied. The game design and learning are grounded in constructionism. As a result of the innovative intervention students participated actively in all the activities e.g., from the beginning to the end of the project for instance brainstorming of design ideas, solving issues, including exploring digital game design platforms which is new to them (self-directed learning), creating QR codes, publishing of the

games and the manuals on websites (their own effort not part of requirement). In the qualitative comments section of the survey the students recorded positive and encouraging responses such as "I understood the content, had fun, motivated, interesting project, should have more projects of the same kind, gained a lot of knowledge, fun and integrated project, most fun module, strengthen friendship despite online learning as meetings" etc. Designing games for learning not only increases students' knowledge and perspectives of sustainability goals but also, equally important, changes students' attitudes toward the goals of learning. The game design approach reveals many rich and engaging learning activities and provides freedom in content learning.

3. Why are they important to education?

Objective

- To provide an engaging learning environment of SGD through on-line learning during COVID -19 lockdown.

- To explore Serious Game Design pedagogy as an alternative approach to enhance student learning experience in non-computing base programme

- To ensure content knowledge is acquired by students using a more enjoyable methods for technical modules that can be "dry and boring" for students.

Value Added

This project/initiative increase learner engagement in terms of cognitive, behavioural and affective aspects as learners go through a meaningful learning experience.

- Cognitive: proactive in thinking about the outcome with a game design idea that suit a target group. Developed suitable roles and characters, explored, simplified, and illustrated SDG goals and targets interestingly for the game. Learning by design emphasizes that they must overall think creatively and not just the content of SDGs.

- Behavioral –Excellent attendance and participation. Most students are on time for tutorial eager to show the works and progress which is very positive. They are also able to decipher the content needed for the game and content needed for the learning which is an important element of the serious game design and how both need to work as a game.

- Affective – Students were very involved in designing each element related to the game design such as characters, colors, icons, size, and dimension of the game components, printing the physical games as to the professional quality. Students were enthusiastic to show the progress and to visualize how it could be played and what knowledge will be gained through this game. Some even instilled a positive and negative element in this game design to emphasize the deterioration of environment and to go with the trend of villains as main characters in movies such as Descendants (Disney), Venom (Marvel) and Joker (DC Comics).

Usefulness

Designing games using SGD for learning not only increased students' knowledge and perspectives of the content but also, equally important, changes students' attitudes toward the goals of learning. The game design revealed many rich learning activities whether it is working with peers on the design or sharing and exchanging designs ideas they learned about concepts such as sustainability, global issues and goals. Additionally, it provided an excellent platform for peer learning as

students worked collaboratively with their peers and tutors in solving various issues associated with the "game design". Beyond that, this approach also encourages and motivates students to explore online platforms to design and develop digital games. Through the various stages and structured activities student will realize that the game design is ultimately a veil for their academic content.

Figure 1: Evidence of Learner Engagement and Outcomes of SGD.

4. Please write any advantages of your innovation / product development / design / process towards education and community.

The SGD approach can be used in other modules in the architecture as well as other domains such as education. Many researchers suggests that Serious Games Design developments supports strong emphasis on behavioural change as means to persuade conceptual or attitudinal change. Thus, it would be more suitable for projects or module that needs to encourage high engagement with students.

5. Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

The project outcomes-the digital and physical games can be effectively used in teaching and creating awareness of Sustainable Design Goals (SDG) goals and sustainability among primary and secondary student and public locally. The products -developed games has potential to be commercialized as a learning tool (physical and digital).

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SCIENTIFIC MEASUREMENT USING APPS IN ARCHITECTURE AND ENVIRONMENT TO ACHIEVE THERMAL COMFORT

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Highlights: The use of mobile apps for learning is not a very popular approach in teaching and learning of an Architecture module but various research has been advocated to learn its potential in the past two decades. During the Covid 19 pandemic, the teaching and learning were forced to be conducted virtually. Lecturers with the knowledge of blended learning were able to switch to the online mode but not without some challenges. The foremost challenge was to retain the Learning Outcome but by doing it differently. The challenge in teaching and learning in this module is the access to Environmental Lab and data loggers that would need travelling and sharing of the devices. The innovation of using the Apps for measuring weather data leading to minor adjustment in teaching and learning of Architecture and Environment without altering the Learning Outcome. The students' perception of learning was captured in a survey that was administered to the class that resulted in 114 responses with 1 discarded for incomplete data. The result evidenced that students enjoyed and had a good learning experience. This innovation suggest importance of using apps in teaching and learning approach in the post pandemic context.

Key words: online learning, apps, architecture, environment, climate, thermal comfort.

Introduction

E-learning provide a learning platform that can facilitate interactive learning at anytime and anywhere. A well-designed e-learning system typically does not only provide learning materials, but also facilitate other activities such quizzes, written examinations, and discussion forum. As e-learning plays an increasingly critical role during the pandemic, the heavy reliant on the use of e-learning also becomes a challenge, not only for higher education institutions, but also students and lecturers. In this module access to data loggers from Environmental Laboratory were disrupted due to the Movement Control Order. The Innovation in teaching and learning for this module is the usage of the mobile Apps to measure environmental data instead of a data logger. The students almost all owned or had access to smartphones which made the teaching and learning accessible for all without changing the Learning Outcome because of the pandemic. Using mobile Apps instead of data logger, produced the same Learning Outcome for this module but with different challenges.

Murphy, Farley, Lane, Hafeez-Baig, and Carter (2014) concluded that use of mobile technologies across these learning activities have logical troughs and peaks indicating that students are using these mobile technologies in a common sense and programmatic manner to best effect to support their learning. Glahn, Gruber and Tartakovski (2015) said that the present research grounds on the concept of "mobile blended learning". This concept refers to educational

designs that include mobile devices for special learning activities in combination with other learning educational approaches and technologies which was used in this module as well. Traxler (2005) in his review of mobile learning described these characteristics emerging which are core characteristics that define mobile learning as Spontaneous, Private, Portable, Situated, Informal, Bite-sized, Light-weight, Context aware and perhaps soon Connected, Personalised and Interactive and the problems or limitations with usability, latency and connectivity may hamper models of teaching and learning. In the context of this module as the students were using the mobile apps for acquiring data at their own space and time, they can do multiple attempts. The problem found by the students are the accuracy and reliability of data. The students were instructed to choose apps with highly good reviews and to do a suggested calibration according to the mobile phone (android or ios). A few tested apps were also suggested. The data will not have an accuracy of a data logger, but it is reliable data for estimating and understanding actual climatic condition and thermal comfort for teaching and learning during the pandemic.

Description of your innovation

The innovation of using the Apps for measuring weather data of lighting level, wind speed, temperature and humidity was done with minor adjustment to teaching and learning of Architecture and Environment virtually without altering the Learning Outcome. Figure 1 shows the similar outcome of students' assignment as face-to-face teaching and learning. The analysis boards contain graphical information of measured weather conditions of exterior and interior space and architecture solutions to achieve thermal comfort. This evidences that the Learning Outcome can be the same for on-line learning and face to face learning with the innovations of using mobile apps.
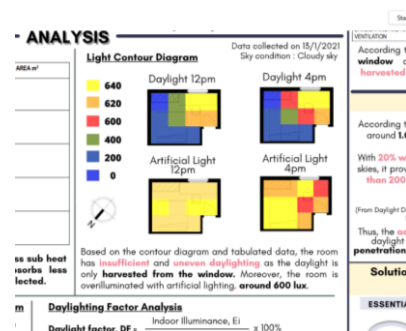
▲ Analysis of measured lux using mobile apps in a space throughout a day (natural and artificial condition) presented in a light contour diagram.
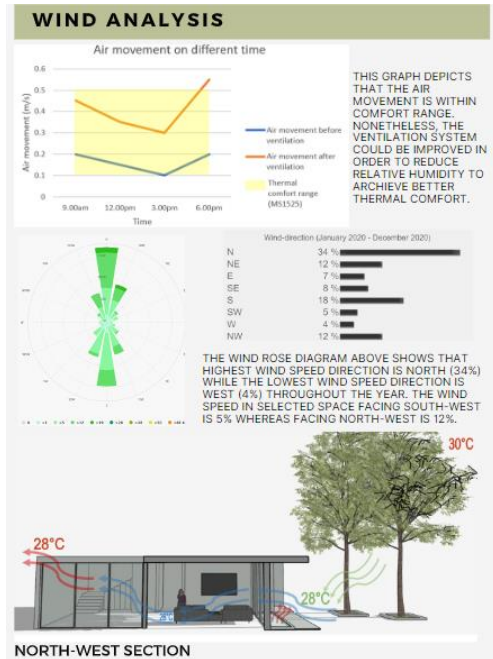
▲ Wind analysis, measured wind speed using apps was compared against thermal comfort and presented in a sectional analysis.

Measured temperature and humidity ▶ using apps was compared against thermal comfort and presented in graphs and a sectional analysis.
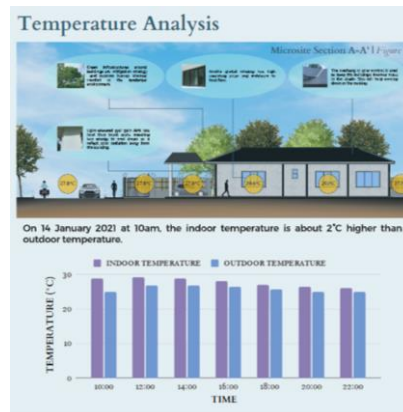
Figure 1: Sample of Assignment using the Apps for scientific measurement of Lighting Level, Wind Speed, Temperature and Humidity and suggestions to achieve Thermal Comfort.

Background

Since the outbreak of the COVID-19 virus, educational institutions from all around the world have migrated from the traditional methods of learning to imparting education through online means (Soni, 2020). With the widespread of the virus, educational procedures have been accomplished via apps like Zoom and Microsoft Teams in this higher educational institution. Additionally, Whatsapp were used for communication purposes, and google slides were used as collaborative tool among group members and to present assignment progress during tutorial in Microsoft Teams. Some pre-recorded videos also supplement the virtual lectures. While the educators around the world were adopting efficient and appropriate learning methods, this Module, Architecture and Environment needed and utilized Apps that can measure scientific measurement of weather such as Lighting Level (Natural and Artificial), Wind Speed, Temperature and Humidity. Not one e-learning method or Apps would suit every learning, but the

chosen method needs careful selection being an innovative solution to assure the quality of the E-learning or online teaching-learning.

Importance to Education

The result of survey evidenced that students enjoyed and had a good learning experience as in Table 1. This innovation suggests importance of using apps in teaching and learning approach in the post pandemic context as below,

- Easy to use, anywhere, anytime

- Frequent use can enhance knowledge and critical thinking

- Reduce bureaucracy in acquiring data logger

- Data logger will be available for research purposes

- Can replace data logger for teaching and learning

Table 1: Descriptive statistic of student's perception of using Apps in Architecture and Environment.

Item	Mean	Std. Deviation
Using the mobile apps is very useful in completing my assignments.	4.32	0.744
Using the mobile apps, my learning skills are enhanced.	4.13	0.747
Using the mobile app, increased my understanding of thermal comfort.	4.08	0.874
Using the mobile apps would enhance my academic effectiveness.	4.04	0.921
Using these apps would increase my productivity (reduce time required to accomplish task).	4.11	0.802
Using these apps can make teaching and learning easier during the pandemic session.	4.32	0.735
Using these apps can make teaching and learning fun activity during the pandemic session.	3.97	0.897
Using these apps can make teaching and learning easier in traditional session too.	4.21	0.746
Using these apps can make teaching and learning fun in traditional session too.	4.18	0.790
I found navigating around the Apps screen to be easy.	4.00	0.882
Distinguishing the appropriate icon for the application for the needed information is easy.	4.22	0.713
The application is user friendly.	3.96	0.921
Valid N = 114		

Advantages of Innovation

The findings indicate that students used the mobile learning solution for extending and enriching their learning experience during the pandemic. Therefore, this study suggests that mobile learning needs to blend into rich learning environments, in which they co-exist with paper books, class-room experiences, laptops, and tablets. The insights define that learning with mobile apps during virtual learning environments and traditional learning or face to face learning can achieve the same Learning Outcome. The potential of using mobile apps need to be explored as blended learning approach to meet the post pandemic challenges of teaching and learning of thermal comfort in Architecture and Environment in higher educational institutions.

Commercial Value/ Process

The innovative use of scientific measurement using apps in teaching and learning can be replicated to any studies that is related to understanding science, weather and climatic conditions, thermal comfort in various levels such as primary and secondary schools and higher educational institutions. This method of learning promotes experiential learning and critical thinking that helps the learner to understand the quantitative data measured and the qualitative environment that they experience and the comfort level. For an example, measuring lighting levels 200lux – I can read and write comfortably, off the light and at measurement of 60 lux for example – I have trouble reading.

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ENHANCING SELF-DIRECTED LEARNING AND LEARNING ENGAGEMENT BY ADAPTING THE SOLE FRAMEWORK FOR RESEARCH METHODS

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Highlights: This innovation introduces a pedagogic design in delivering Research Methods module through the development of a framework inspired by the Student-Owned Learning Engagement SOLE to promote self-directed learning and to increase students' engagement in learning. Commonly, Research Methods often involve didactic teaching that provides students with the required theoretical knowledge and is teacher-led. Embracing the student-centred learning and assessment as learning, as the forefront, the blended learning environment which has been delivered in 2019 that included a curation of integrated small-group student-centred activities, experiential learning, gamification, and peer and self-assessments were transformed into a fully online platform in 2020 with the key intention to promote self-directed learning and increase students' engagement in learning.

Key words: Self-directed learning, learning engagement, SOLE Framework, Research Methods,

Introduction

Research Methods has always been characterized as a lecture-driven, teacher-led and didactic module. Since 2016, I have been exploring ways to design a pedagogy for Research Methods (in architecture) to promote self-directed learning and to increase students' learning engagement through small-group student-centred instructional methods including group work, experiential learning, gamification, and peer and self-assessments. In 2019, the module has reached a mature state and has received positive feedback by students and recognised through the University teaching and learning award. In 2020, as a resultant of the shift to online learning due to the Covid-19 pandemic, the module has been designed and conducted fully online. Adapting from the Student-Owned Learning Engagement SOLE to promote self-directed learning and to increase students' engagement in learning, the overall pedagogic design for this module has been translated from face-to-face tools and activities to virtual ones.

Content

1. The Pedagogic Design - The Conceptual Framework

The overall pedagogy was designed in response to the need for student-centred learning led by assessment as learning. The innovation encompasses the pedagogic design of the entire 14-week Research Method module which was designed and delivered fully online via synchronous and asynchronous teaching and learning. In seeking to develop the pedagogic approach via the Moodle platform, the combination of active interaction, diversity of teaching activities, and systematic design of classroom delivery are important elements that underpin students' positive learning experiences. A conceptual framework that guides the module delivery via online platforms was developed as follows:
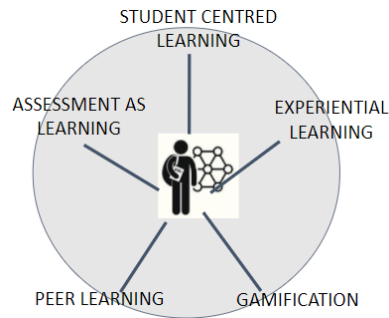
The Moodle site was designed based on an earlier Self-Study Guide which was developed in 2016 to guide independent learning and in-class activities/pedagogic approaches/teaching tools. The transformation of the Guide into the Moodle site is to foster independence and autonomy of learning in a systematic and organized manner by taking into consideration the students' experience. The use of synchronous and asynchronous learning activities through this planned online learning experience enables students to engage in learning effectively and at times at their own pace.

Adapting from the SOLE Model (Student-Owned Learning-Engagement) originally conceived of as a response to Professor John Biggs and his work on Constructive Alignment, Professor Diana Laurillard's influential 'Conversational Framework' and Professor Grainne Conole's work on Toolkits and embedded pedagogy, the pedagogical approach is developed into a five-step cyclical model:

1. **Teaching via Lectorial and technology-assisted interactive tools** - Embedded technology-assisted tools such as Kahoot It and Poll Everywhere were used in the classroom to increase student participation in the lecture-based module through principles of gamification. Kahoot It was used for 2 purposes: firstly, to check on student's acquisition of learning at the end or at the start of a class synchronously. At times, it was also used as a self-paced quiz asynchronously. On the other hand, Poll Everywhere was used within the lecture. Its main purpose was to check on student's understanding throughout the class. Polling questions in diverse formats were used.

2. **Experiential Small Group Learning** - Experiential learning is a means of acquiring knowledge through action and feelings; it creates an emotional understanding and changes attitudes. The intent was so that students can recall the information shared in class compared to a didactic lecture. The Experiential learning was encouraged by conducting lessons using small group discussion via breakout rooms (in Zoom), mind-maps and "pecha kucha" via the virtual platforms.

3. **1:1 Assessment-led Tutorial** - Synchronous tutorial sessions were conducted to discuss the Assessment tasks undertaken by students. This provided personalised feedback and learning to students.

4. **Peer Assessment** - Supporting the concept of assessment for learning and assessment as learning, peer-assessments can be used for any type of assessment in any module/programme. In this module, it was used for the final assessment (Research Proposal). To promote independent learning, self and peer-assessments were introduced in 2018 which were later upgraded to online versions, for students to be able to evaluate their peers and themselves via Moodle.

5. **Reflect and Act**: Feedback on the pedagogical design was progressively received and actions/improvements were continuously implemented in the classroom

2. The context or background of the innovation

Commonly, Research Methods is teacher-led and didactic by nature. From the literature cited, one of the negative issues impacting teaching research is the non-innovative teaching methods. In a recent literature review conducted by Wagner, Garner & Kawulich (2019), it was noted that studies on specific techniques for teaching Research Methods are significant aspects of pedagogical research. Diverse approaches such as problem-based learning, experiential learning and collaborative learning, and having students conduct their own projects have the propensity to engage students in learning (Zamorski, 2002; Healey, 2005; Larkin & Pines 2005). Also, Allen & Baughman (2016) emphasized the significance of having activity-based workshops to enhance students' learning in research methods. In a study conducted by Groessler (2017), common challenges emerged from the change from lecture-based to active and authentic learning strategies.

The pedagogic design of Research Method began to be developed in 2016 leading to its design in 2020 as a fully online module, yet integrating diverse teaching tools that foster self-directed learning and increases students' learning engagement.

Continuous feedback was collected from students in Week 1, Week 3 and Week 9. Generally, there has been encouraging feedback in Week 1 with students mentioning words such as systematic, organised, interactive, engaged, and clear. In Week 3, feedback suggested 100% were engaged in the class, and the continuation of the interactive activities. The teaching engagement survey in Week 9 also illustrated a comparable score between the interactive face-to-face modules in 2019 versus the fully online module in 2020. The scores were consistent between both with all dimensions measured were between mean scores of 4.6-4.9 (Median of 5).

3. Why are they important to education?

They are important because it directly impacts on students' learning engagement in a fully online classroom. The innovation draws from student-centred learning, experiential learning, online learning, assessment as learning and diversity of learners, by which these are key characteristics for good teaching & learning practices.

4. Advantages of your innovation and design towards education and community.

The advantage of the innovation and its greatest learning value lies in the overall pedagogic design that integrated diverse teaching methods to foster self-directed learning and it has the capacity to provide a highly engaged module fully online.

As this innovation is about pedagogic design, it can be generalized and replicated in diverse settings and for Research Methods modules in different disciplines.

The fully online module comprising asynchronous activities online enables students to have flexible learning. These activities that utilise diverse online tools are developed into ready-to-use templates.

5. Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

The commercial value includes the conversion of this module into micro-credentials. Also, a customised framework/model can be further developed and copyrighted.

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DIGITALISED HIGH-ORDER THINKING LEARNING FOR DIGITALISED COMMUNITY USING TECH-VAR MODEL

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Highlights: The advancement in the educational technologies creates an opportunity to transform traditional classroom learning into digital learning. However, it is challenging to achieve the impactful learning at digital mode. Therefore, the TECH-VAR Model innovatively designed to promote high- order thinking skills and sustaining impactful learning towards digitized community.

Key words: digitalised learning, TECH-VAR learning mode, higher order thinking.

Introduction

Based on the reports generated by Bustamante (2020), nearly 81% of the students are less engage in online learning due to the sudden transformation. Furthermore, there are more challenging to maintaining active learning towards digitalised community which consists of more than 300 students. Therefore, the instructor plays an important role in innovating an effective learning model by integrating educational technologies to promote student engagement and triggering their eagerness to continue explore the knowledge with self-directed mode.

The TECH -VAR innovative learning model was employed on Year One undergraduate Macroeconomics students. Based on the students' result and feedback, this model successfully sustaining student engagement as well as active participation throughout the semester.

TECH-VAR innovative learning Model

COVID-19 pandemic in 2020 has urged for an immediate 360-degree transformation in the delivery and learning mode at Taylor's University. This sudden transformation creates a challenge among the students to adapt, immerse, and achieving high order thinking skills in the online learning environment. Therefore, TECH-VAR has been designed in the way to fit various types of learners and encouraging depth learning instead of memorizing the content. The following figure shows TECH-VAR learning model that innovatively designed towards digitalised community.
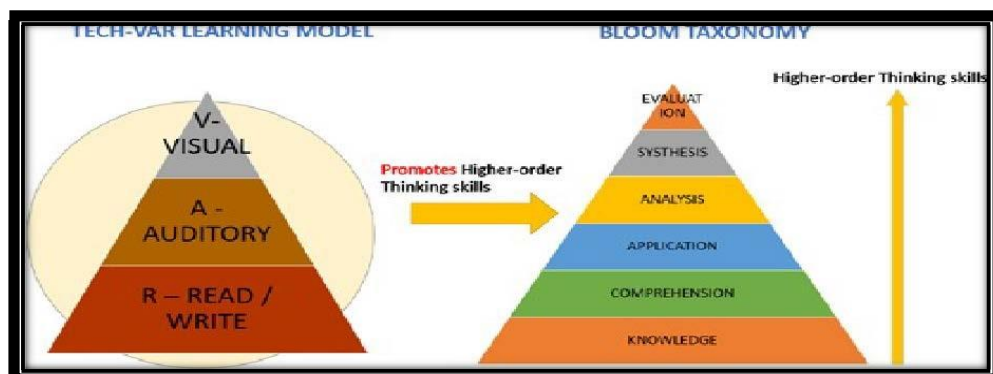
The pedagogy of TECH-VAR learning model has been drawn from the combination of VAR elements which consists of visual, auditory, read - write and Bloom Taxonomy. Furthermore, numerous educational technological tools used to achieve the learning objectives and reached wide range of learners. The following figure showed how's TECH-VAR learning model implemented in the design and development of online learning module to promote active learning and sustaining student engagement through scaffold and self-directed learning.
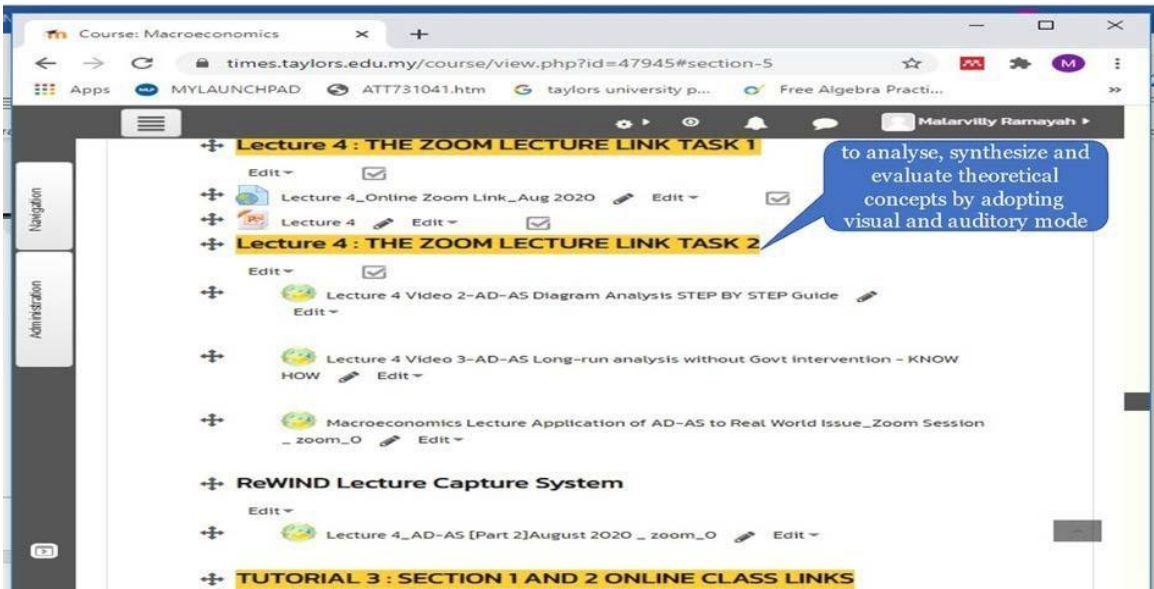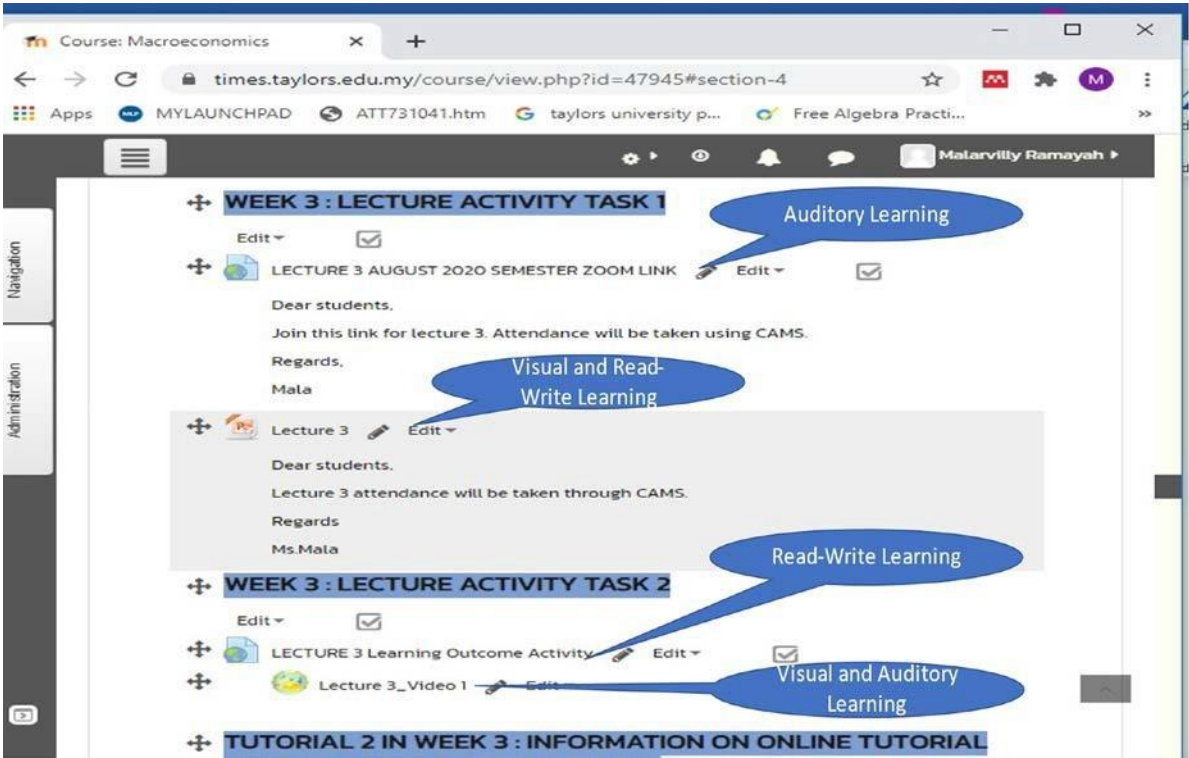
Importance of TECH-VAR model to education

TECH-VAR provides engaging and meaningful high-order thinking learning experience to students through enhancing their skills in identifying, analyzing, and interpreting the subject-related knowledge. For instance, the Year one Macroeconomics student able to apply the knowledge learnt to analyze real- world issue from a newspaper article on a country's budget to fiscal policy. The learners can relate the real-world issue to the relevant concept and analyze it by employing appropriate theoretical diagram analysis to identify the policy impact on real Gross Domestic Product (GDP). This was done by including extraction of newspaper articles in the lecture slide. In enhancing further, the application skills, questions were developed related to national and international economic issues made available in study guide and discussed during tutorials for specific topics. Discussion on how the key issues in the article can be related to the relevant Macroeconomic concepts illustrated through visual and auditory digitalized learning. Meanwhile visual and read-write digitalized learning employed when analysing related theoretical diagrams. Such practice has enhanced learners' analytical skills and writing skills related to real world economic issues. Through digitalized learning using TECH-VAR facilitator was able to provide instant feedback and guidance to learner like face-to-face learning to enhance higher order thinking.

Advantage of TECH-VAR model

With TECH-VAR learning model the learner had opportunity to take ownership of his learning to relearn the unlearn. The visual and auditory learning that allows the student to understand concept application which enhances learner's critical thinking skills that are crucial for high order thinking learning. Application knowledge that is gained through these two learning styles can be employed by the learners through read-write when they illustrate their findings. The overall performance of students has improved drastically comparing face-to-face to digitalised learning mode. The quality of overall performance in this module has been enhanced further through the TECH-VAR technique. A great hike is identified in **Grade A where the is a drastic improvement by 19%. At the same time the failure rate has declined by 50%.**

Distribution of Overall

	A	A-	B+	B	B-	C+	C	D+	D	D-	F	IN
■ Online Learning via TECH-VAR	4	11	13	8	11	5	6				6	0
■ model	2	9	1	1	1	1	1				1	0

■ Online Learning via TECH-VAR   ■ Face to Face
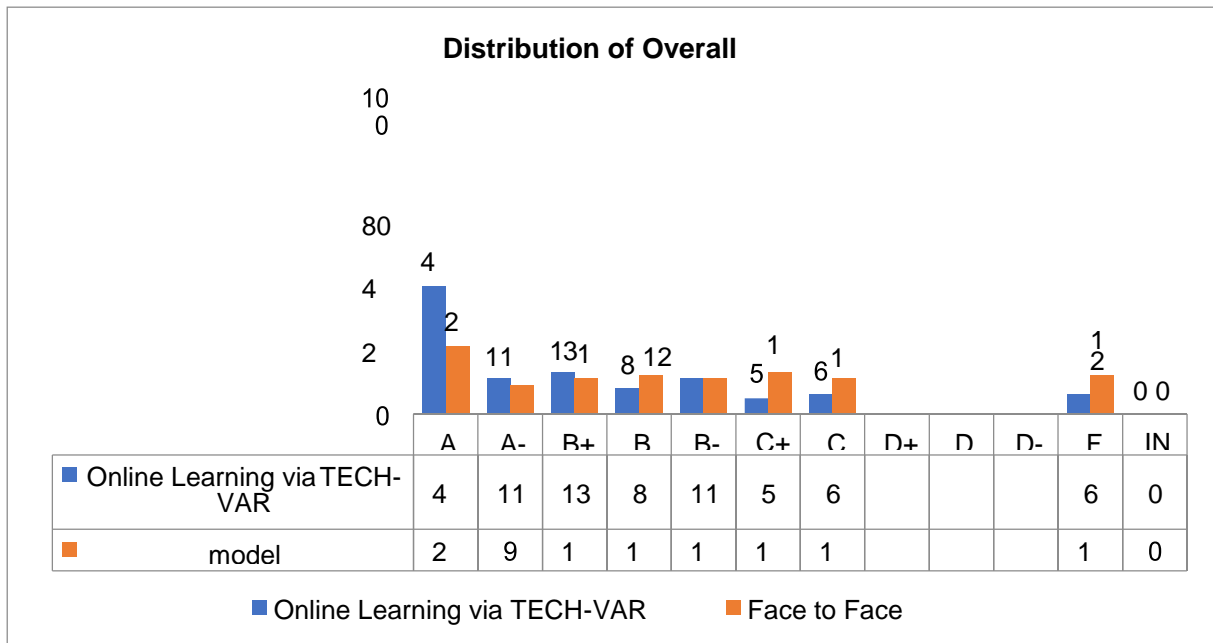
With the above result, the TECH-VAR learning model may be implemented to any online learning courses that needs to achieve high-order thinking skills as well as active learning and sustaining student engagement. Furthermore, it gives added value to the digitalised community by building good repo among the students and instructor as there is opportunity for instant feedback and frequent interaction with peers.

Since TECH-VAR learning model has been tested with more than 300 Year One Macroeconomic students, this model is found appropriate to teach bigger scale. Therefore, it is suitable for other Higher Education Institution that is handling courses or subjects taken by large group of students. Finally, it is a least costly method to depart knowledge for high order thinking learning effectively to learners with different learning abilities.

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ENABLING MULTIDISCIPLINARY DESIGN COLLABORATIONS DURING LOCKDOWN BETWEEN FACULTIES AND INDUSTRY COLLABORATORS

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Highlights: The Covid-19 pandemic forced an abrupt shift to online remote learning. This synchronous collaborative learning with Design Thinking replicates the in-person experience of project-based and situated learning for collaborative design projects amongst multidisciplinary students. Remote students were engaged individually to participate and contribute in group settings kinaesthetically, transforming passive learners to active virtual collaborators. The online Design Thinking collaboration provided a realistic industry scenario that prepares students for professional practice in the new normal. This multidisciplinary design collaboration pedagogy is applicable to any discipline at the higher education level which transcends locations and time zones, enabling students and faculty collaborations across the world.

Key words: multidisciplinary, remote learning, synchronous collaboration, design practice

Introduction

During the recent pandemic lockdown, the challenge arose in facilitating a multidisciplinary collaboration module to work on industry project briefs at The Deign School, Taylor's University. The multidisciplinary design collaboration project involved students from the Bachelor of Design (Hons) in Creative Media, Bachelor of Computer Science, Bachelor (Hons) of Software Engineering and Bachelor (Hons) of Information Technology programmes. For 14-weeks, 35 students from the Creative Media degree collaborated with 26 other students from the computing school to design an interactive Virtual Science Gallery for Petrosains, The Discovery Centre; a web portal revamp for Cyberjaya Farmer's Market, an app for Feast-in and We Are Your Eyes. A total of 8 groups were formed comprising of students from various specialization skills such as graphic design, interactive design, animation, visual effects and concept art design, app and web development, game development and human computer interaction. The classes were conducted fully online utilizing Google Doc, Microsoft Teams and Miro for the synchronous design collaboration. The Petrosains project was conceived to address the inaccessibility of 10 - 18 year old school students to the Petrosains' Science, Technology, Engineering and Mathematics (STEM) exhibits due to the Movement Control Order (MCO). The project brief was to produce a virtual experience that would create the awareness and exposure to STEM education within the theme of Oil and Gas. A Virtual Science Gallery was created using the Unity Game Engine, providing a 3D simulated experience to the 10 - 18 year old students, to interact with various interactive animation and mini-games that teaches them about STEM, Oil and Gas refinery. As for the Cyberjaya Farmer's Market, this portal revamp was needed to reach new micro-entrepreneurs to invest and build the cottage industry. The Feast-in and We Are Your Eyes website and app projects involves creating a new app as startup businesses.

Content

Design Thinking is a renowned and widely accepted design solution method practiced by organizations of varying industries across the world, such as Google, IBM, Apple, Deutsche Bank, Airbnb, Procter and Gamble (Kolko, 2015, Dam & Siang, 2018). It is highly effective for multidisciplinary groups in designing solutions for complex ill-defined problems (Bailey et al., 2018; Rittel & Webber, 1973). Implementing Design Thinking for a fully online multidisciplinary student group project is not common practice (Gleason, 2018). The innovative approach of practicing Design Thinking remotely with synchronous virtual collaboration on Miro, a virtual online whiteboard and project management tracking on Google Document and the Microsoft Teams live video conferencing communication was needed. The constructive alignment for the teaching and learning activities, assessment and module's learning outcomes, forms the pedagogical framework as shown in Fig. 1.

Figure 1: The Design Thinking Pedagogical Framework for Full Online Multidisciplinary Collaboration
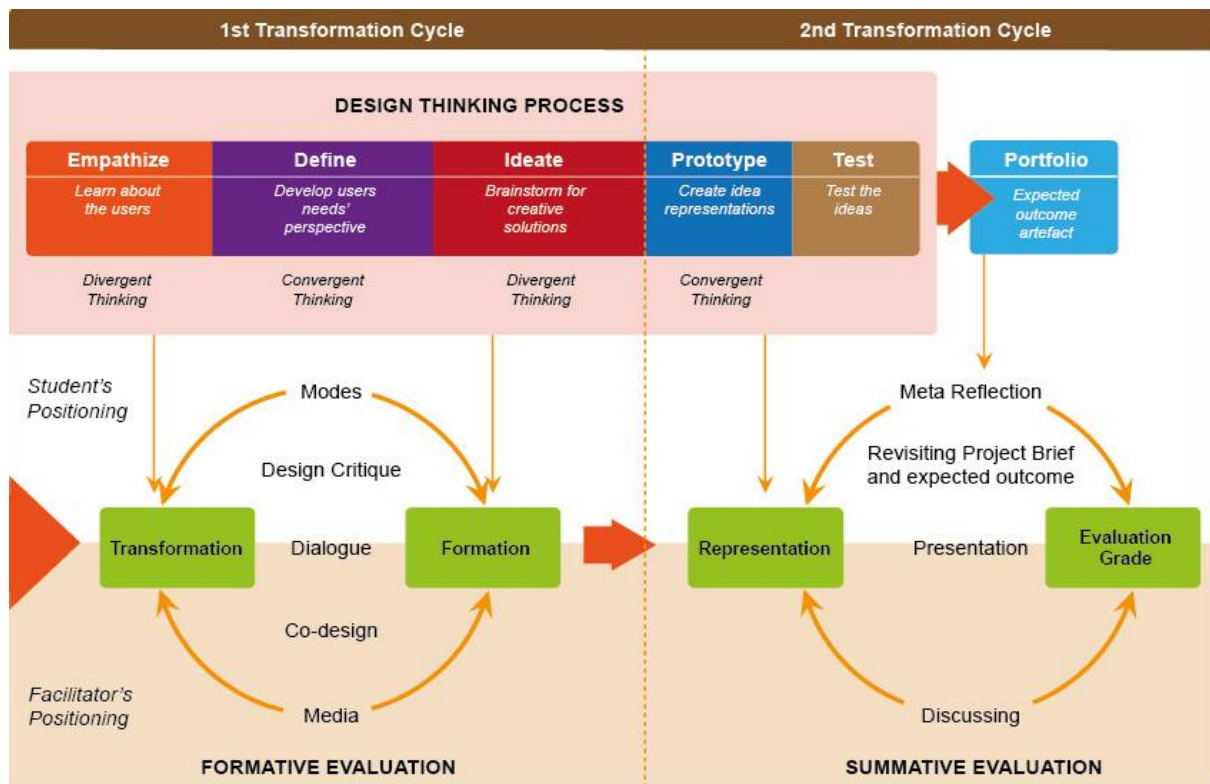
The Design Thinking model of d.school, Stanford University was combined with the formative and summative evaluation cycles to form the pedagogical framework that was used for the remote synchronous multidisciplinary collaboration (Dam & Siang, 2018). The student groups practiced the 5 stages of the Design Thinking process utilizing Miro, Google Forms, Docs, and Microsoft Teams demonstrating the learning activities as shown in Table 1.

Table 1: Full online multidisciplinary learning activities and platforms

Platforms	Teaching and Learning Activities	Design Thinking Process and Learning Weeks	Types of Assessments
Google Forms	Online surveys	Empathy (week 1 – 2), Test (week 5 -13)	Formative
Google Doc	Project Management and reflections	Define (week 2 – 3)	Formative
Miro	Co-design, design critique, media sharing and production, presentation	Ideate (week 3 – 4), Prototype (week 5 – 14)	Formative and Summative
Microsoft Teams	Interviews, dialogue, discussions and design critique	Empathy (week 1 – 2), Test (week 5 -13)	Formative

The online synchronous design collaboration discussions and demonstrations were conducted on Miro where each student's actions via the navigation cursor is visible real-time, much like the physical domain of design studios where whiteboard collaborations and computer screens are shared. All actions on screen is recorded as text statements generated automatically with time stamps and location tags. These are invaluable for formative assessments, complemented with the facilitator's annotated notes and comments. Students could share any referenced work and media as development evidences on the cloud. With internet access, all group members could contribute, revise and annotate each other's work progressions anytime and anywhere which includes the facilitator as evaluations and assessment of progressions and developments are seamless without time and location constraints. Students are able to work autonomously and learn from the formative assessments as well as from peers, constructively creating new knowledge from the collaborative proximity. All of the student groups used Google Doc for project tracking purposes and also reflection documentations. The objectives of providing a seamless integration between individual student design practices and communication was achieved with synchronous design collaboration that manages and evaluates competency developments online and in real-time.

Multidisciplinary collaborative design skills and competencies is Industrial Revolution 4.0 (IR4.0) relevant (Sima et. al, 2020). The pedagogical framework facilitates the Design Thinking method in solving complex multidisciplinary problems in groups that are fully remote or as hybrid physical and online collaborations. This project-based and situated learning approach builds competencies for critical thinking and problem-solving skills when students strategize to synthesize, assess and evaluate their project's objectives while managing their resources, production schedule, expectations of the group and industry collaborator (Matthee & Turpin, 2019). This pedagogical framework produced a 38.4% increase of students scoring grade A and increased student satisfaction. Overall, the students' commented that the multidisciplinary design collaboration with the computing students is beneficial for their future careers where the industry would be multidisciplinary in nature. They also realize the advantage of collaborating to merge various skill sets and knowledge in order to solve problems innovatively. Some of the students initially faced challenges in working remotely online but adapted to this new practice soon after with the use of the real-time collaboration tools such as Miro and Google Doc.

The pedagogical framework provides the versatility for any multidisciplinary design collaborations due to the widely accepted Design Thinking methodology in solving complex

problems, complemented by the Miro platform, video conferencing and Google Docs' online document sharing; which eliminates the location constraints.

The initial application was applied to second and third year undergraduate project collaborations, but was expanded to first year students where approximately 1,200 students used this pedagogical framework for the university-wide compulsory module at Taylor's University. Multidisciplinary lecturers from various faculties were trained to familiarize with the Design Thinking pedagogical framework before teaching the classes for the very first time fully online.

This pedagogical framework has won the Taylor's University Exemplary Meritorious Academic Staff (EMAS) Award 2020 for Immersive Learning.

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BORDERLESS LEARNING APPROACH @ TAYLOR'S: NO STUDENT IS LEFT BEHIND

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Highlights: This "Borderless Learning" project is designed in response to Ministry of Higher Education (MOHE) decision to allow students returning to campus during the pandemic in phases from July 2020. Although it was a relief to those in clinical and practical-based courses, it also posed another challenge to the academics. Restricted number of students allowed on campus would mean that academics need to find a way to teach two groups of students concurrently: one group attending the class face-to-face (F2F), and another group attending it remotely. This Borderless Learning project identifies the crucial components required for learning continuity for all Taylor's students during the pandemic.

Key words: Learning continuity, Remote Learning, Online Learning, Learning Circle

Introduction

Since the implementation of Movement Control Order (MCO) in March 2020, all Taylor's lecturers have migrated their teaching and learning activities to online deliveries. Although it helped in ensuring the students' learning continuity, it was still a challenge to the lecturerss and students especially those who are involved in clinical or practical courses. During this period, not only they need to familiarise themselves with the online tools available, but more crucially they will need to embrace and make adjustment to the possible alternatives to the practical learning session (Shetty, 2020). The announcement by MOHE allowing all university and college students of higher educational institutions to return to campuses in phases starting from July 2020 (Kaur,2020) would mean that these students will get the chance to catch up with the learning experience that they have missed out for the last few months, but within certain restriction. Only 30% of students' population were allowed on campus. International and out of town students were still unable to return to campus on time due to border closure, health advisories and quarantine restrictions. All these posed another challenge to the lecturers that they will need to address two groups of students in their class: one group of students in campus and another group of students accessing the lesson remotely via synchronous learning platform.

To deal with the situation, Taylor's University has introduced their unique "Borderless Learning" (BL) approach starting from August 2020 Intake. This BL is a concurrent in-person and online class approach that aims to ensure that no student gets left behind. Through this approach Taylor's University new students will enrol in their programme fully online but with the freedom to continue classes at Taylor's Lakeside Campus at any point of time. Students with practical classes will also take turns to go back to campus for the laboratory or studio session.

Blended Learning Approach @Taylor's
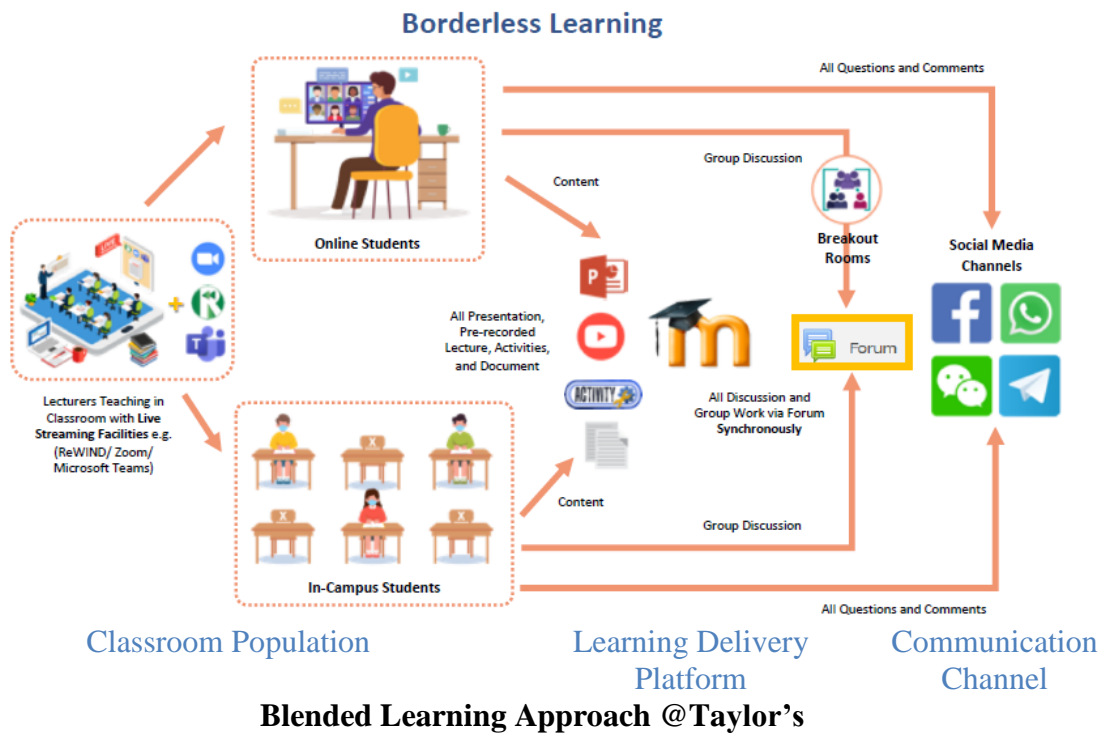
There are three important components of the BL approach: **Classroom Population**, **Learning Delivery Platform** and **Communication Channel**. Classroom population consists of the Lecturers, In-Campus Students and Online Students. In this BL approach the lecturer will be teaching in classroom with Live Streaming Facilities such as Zoom, ReWIND or Microsoft Teams. In this scenario, the lecturers will be having slightly changing role. He is now both the learning curator that will curate the learning activities based on the existing classroom population and he will also act as the online learning facilitator to facilitate those who are accessing the class online. To ensure equal access to fact, opinions, and arguments taken place in the class, Learning Circles are created among in-campus and online students.

The **Learning Delivery Platform** is the common platform to host learning resources and conduct online learning activities. Through this learning delivery platform students will attend live stream classes and engage with lecturers through tutorial & interactive activities. Online tools for group activities are created so that online students can also participate and responded to the activities using icons (thumbs up in Zoom) or emojis (in Teams). In general, it is through this learning delivery platform that the lecturer will curate his lesson so that it will offer a hybrid best of in-person, online synchronous and asynchronous learning experience to the students.

Sample of Learning Activities Conducted via Borderless Learning Approach @Taylors

The third component of this BL approach is the **Communication Channel**. Social media such as Telegram, Facebook group, WhatsApp and WeChat are used as the communication channel. Communication channel is the platform for students to channel all questions and comments for the lecturer's timely response. To ensure effective communication and equal information dissemination, in-campus students are also encouraged to post their questions in the communication channel so that it will benefit the online students as well.

In dealing with the current pandemic, approaches such as this Borderless Learning@ Taylors is crucial to ensure the learning equitability and accessibility to all students, no matter where they are or what is the nature of their course. Upon the successful implementation of this approach, it is surely can be shared and replicated by other institutions to ensure learning continuity during this pandemic.

Acknowledgement

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EMPOWERING PROJECT-BASED LEARNING CAPABILITIES IN ENERGY AND ARCHITECTURE MODULE

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Highlights: The class utilises online materials such as YouTube videos, TED talks, multiple choice questions, subjective questions discussions, journals in the Taylor's University teaching and learning portal (TIMES) and Microsoft Teams online tutorial sessions. Due to Covid-19 pandemic situation, the method has tremendously changed the teaching and learning environment replacing the audit on site observation and field measurement method with structured online lecture series and tutorials. The pedagogic aims of the project-based learning framework mapped to the Energy and Architecture module as suggested by Arce et al (2013).

Key words: Project-Based Learning, sustainable education, online learning.

Introduction

By adopting the project-based learning methods and activities, this practice has inspired and motivated students in problem solving, engaging students in complex questions, managing the challenges in a structured and environment in real-world issues, and identifying more effective and innovative solutions optimizing their limitations. Due to the critical COVID-19 pandemic situation and challenges in the online teaching and learning environment, the architectural students' program faces a vital challenge to participate in a field study or on-site audit exercise. The teaching team has identified a new module entitled Energy and Architecture to establish a walkthrough audit exercise based on the project-based learning method. This assignment was able to create the opportunity to co-creating the role of a walkthrough audit as a process used to establish a general practice of the potential energy savings through visual observation on the HVAC, lighting, building maintenance, and other factors affecting energy consumption of the building in a selected site chosen by students. A simple calculation has been carried out to determine the current and potential implementation of the identified Energy Conservation Measure (ECM). Usually, the actual _eld on-site audit exercise is carried out in 1-2 days with/without a team depending on the scale and complexity of the building using the tools (lux meter, thermometer, and hygrometer) to achieve its sustainable educational objectives. The results are based on the Teaching Evaluation Survey and students' cumulative achievement analysis at the end of the two semesters in 2020 conducted online. The survey seeks to construct validity of the evidence on the project-based learning effectiveness in the module. Students are observed

accomplishing a field measurement exercise to establish the incoming load profile, significant energy usage (segmentation), HVAC and lighting system of their own residence, during the 'new norm' guided teaching and learning with weekly online learning session. Students are strategically able to identify the principles of energy-efficient systems and the general practice of potential energy savings with inspection and evaluate energy consumption. It was also observed that the implementation of energy efficient strategies to reduce energy usage in design to deliver a low energy architectural design practice evidenced in the submitted audit energy report at the end of the semester. Student engagement is evident to be positively related to practical methods, teaching evaluation, and validated assessment rubrics.

Project-Based Learning (PBL) Framework in Energy and Architecture Pedagogy

As suggested by Arce, Tabares, Granada, Miguez, and Cacabelos (2013), this learning strategy allows students to develop new skills to supplement their training and coaches them for their future professional performance especially in energy and sustainable practices. The pedagogic aims of the project-based learning mapped to the Energy and Architecture module as suggested by Arce, Tabares , Granada, Miguez, and Cacabelos, (2013), are addressed as follows:

1. To promote a strong theoretical basis of supervision and analysis for energy saving in low energy buildings.
2. To describe the impact of the built environment on the global scene and understand energy demands in low energy buildings.
3. To identify the principles of energy efficient systems in architecture and building technology.
4. To develop work schemes for an energy audit practices in selected buildings.
5. Apply strategies of renewable and energy efficient strategies to deliver low energy architectural design.

To strengthen the gap in PBL acquires other competences such as initiative, teamwork, communication, multidisciplinary focus, self-regulation, and compromising to be integrated to the learning experience. In line to reflect the project-based learning implementation in this module, recent literature suggests that a student-centered learning strategy is a powerful setting to building students' competencies and that it should be based on four learning principles (Dolmans and Schmidt 20 I 0):

1. Constructive learning: students should learn constructing their knowledge base by connecting new information with existing knowledge (e.g. through discussion).
2. Collaborative learning: students should learn collaborating with each other in order to maximise learning effects through peer-to-peer teaching (sharing knowledge, challenging, negotiating, etc. in small-group work).
3. Contextual learning: students should learn to consider relevant context of cases and problems in order to be able to transfer and apply insights and knowledge to different cases (e.g. through real-world problems).

4. Self-directed learning: students should learn to regulate their learning by playing an active role in planning, monitoring, and evaluating their learning process (e.g. through elaborations on subject matters of own interest).

A set of framework is suggested to map the task and instructions to the student-centered learning strategy and PBL strategy as follows in Table 1:

Table 1: Mapping Challenges to PBL Pedagogy achieving Learning Outcomes

Instructional practices suggested by Condliffe et al. 2015	Student-centered learning strategy by Dolmans and Schmidt 20 I 0	Project based learning strategy	Specified task implemented
Framing the Purpose of Learning (Compliance)	Constructive Learning	connecting with new knowledge	intriguing topic/issues on energy management in their own home/building for example on energy consumption pattern based on façade and climate-based profile, historical, physical and geographical data collected
Intentionally Structure Collaboration (Engagement)	Collaborative Learning	collaborating with peer to peer teaching and learning (sharing knowledge) transfer and apply insights and knowledge to real-world problems	working out an inventory list of electrical appliances, drafting the inventory table according to space, electrical appliances, watt per appliance, hours of usage per day and compare weekdays and weekend energy usage and cost then identify what cause the differences and possible CO_2 emissions.
Design and Use Appropriate Scaffolds for Student Learning and	Contextual learning and self-directed learning	playing an active role in planning, monitoring, and	Reporting the observation of occupant activities and behaviour

Revision (Empowerment)		evaluating their learning process	towards energy usage/saving and finally, suggesting potential energy saving measures to reduce monthly energy consumption.

The table 1 above establishes the educational models of project-based learning of the energy and architecture module which incorporate these four learning principles and have been further developed in direct response to the calls for innovation and transformation in sustainability education. Thus, this project aims to strengthen the co-partnership and participation during the class activities and developing their assignments progress. Compared to earlier PBL setting, student learning shifts from passive (course instructors deliver, students receive) to active (students deliver, course instructors provide feedback), and students work on real-world problems by engaging in small-group work (ideally in interdisciplinary teams) and often collaborating with stakeholders on developing solution options to the identified problems (Brundiers and Wiek 2013).

Figure 1: A new set of Teaching and Learning Framework developed for the Energy and Architecture Module

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UNLEARNING IN THE TIME OF CONTINUOUS LEARNING: NEW NORMAL LEARNING EXPERIENCE (Lx) OPPORTUNITY

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Highlights: A reinforced learning experience (L_x) framework (through a) developed, executed, and evaluated against pre-COVID19 and COVID19 operational semesters. This framework is designed through the unlearning approach of the inhouse design thinking tool and lateral executive of curricular delivery, assessments, and evaluations.

Key words: Unlearning, reinforced learning, L_x, learning outcomes, new-norm education, COVID-19

Introduction

Education, via university education through its curricular delivery and assessments, builds its stakeholder professionally and personally in higher education (Aravind C.V., 2019). The COVID-19 scenario creates a need to change the educational framework towards newer ways for the success merits without quality compromises. The fundamental mindset is the shift that require to unlearn the old techniques and strategize towards reinforcing success strategies from that of the status-quo in parallel fields (Vaithilingam, C, 2019).

Unlearning is not a newer aspect to realise, but it creates an opportunity to let go of what we know and gives way for new ideas which demands persistency (Kummitha, 2019). This is very core in the way various design thinking courses are built in around the globe. Traditionally applying these reinforced action plans in the ever-rigid educational pedagogy is highly challenged by professional bodies, the teachers, and the other stakeholders as it does not rely on a universal template or framework.

However, with the continual prevailing aftermath effect of COVID19, there is no other way, except to align for alternate ways, for continual university education, with the only constraint being not to override the promised outcomes the curricular demand.

In this work, we present the application of reinforced learning experience in the curriculum at the tertiary level using the inhouse built design thinking framework. This tool is used for

reinforcement learning of the framework developed and is applicable during unforeseen circumstances without compromising the quality marks.
Content

Background (Why we do this)

Design thinking approaches are heavily taught and often seen as a tool aligned towards engineering innovations (Bryan J. Ranger, 2018). But very often the core of this approach is alienated from applying it for common challenges. CODE is a design thinking approach developed inhouse by the team from the engineering faculty. This approach primarily uses value coefficient mapping towards solving the common engineering and non-engineering challenges. We extensively used this tool for training students and professionals and when the pandemic struck an educational disruption across all levels of education from primary to tertiary, we seek to apply this to develop a translational framework for the operational of the programme, well within the same quality index measurements pre-COVID19 semesters. This work proposes a way in which the engagement of students and curriculum can be approached in the future through a reinforced learning approach using design thinking strategy for parallel fields.

Mapping Uniqueness towards Educational Needs (How we do this)
Figure 1 shows the step-by-step approach in specific to a module done under the programme in the March 2020 semester. This is done with mapping to the outcomes according to the curriculum structure. No change in the evaluation mappings for the alternate assessments of the individual modules.
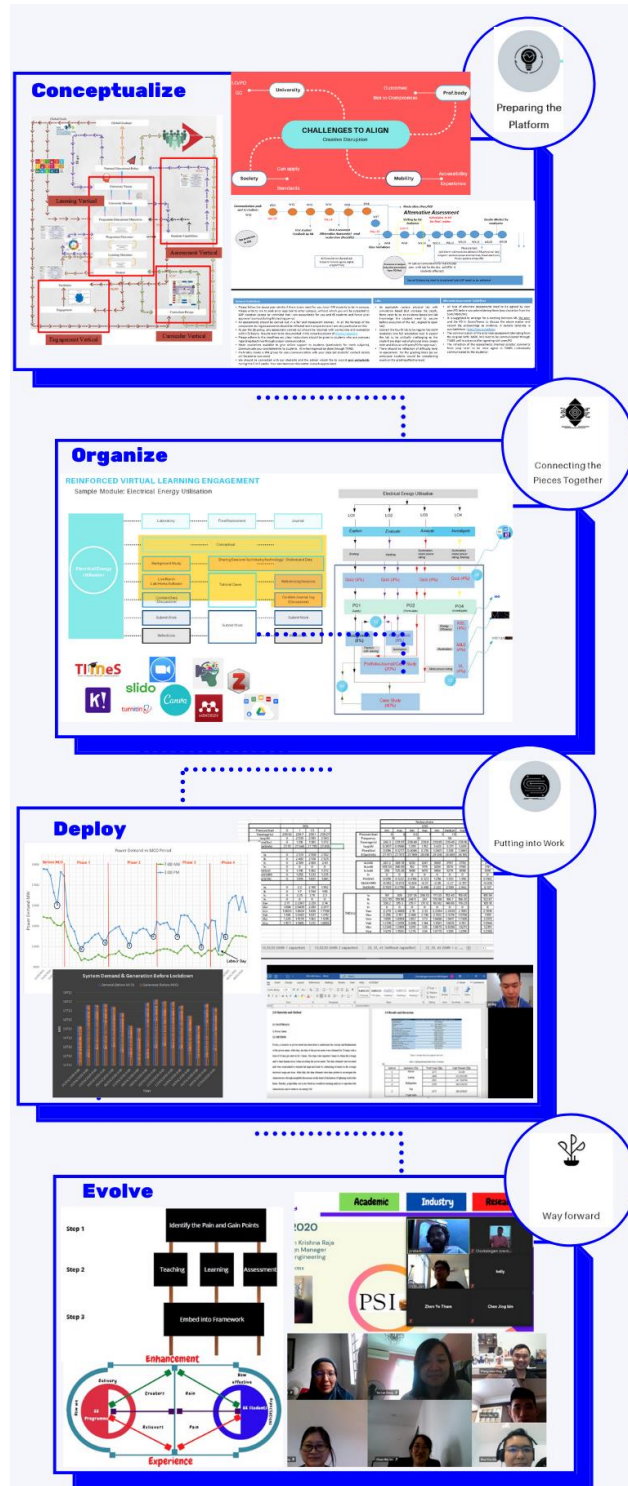
Figure 1. Reinforced Design thinking tool towards operational framework of the programme
(Organize and deploy are in specific for a module)

Advantages and Value Coefficient (What are the implications through this)
Teaching Engagement Scale (TES) (Vaithilingam C.A., 2021) is used to evaluate on the outcome
achievements as seen in **Table 1**.

Table 1: Outcomes comparison before and after reinforcement learning experience.

Programme Outcome (PO) Indicator	March Semester (%)	
	2019	2020
PO1: Apply the knowledge of mathematics, science, engineering practices, innovation techniques, entrepreneurship, and human factors to provide value-adding solutions to complex Electrical and Electronic engineering challenges	87.5	85.0
PO2: Identify, formulate, analyse and document complex engineering challenges to arrive at viable solutions and substantiated conclusions	75.0	95.0
PO3: Conduct research and investigation into complex challenges using methods which include experiment design, analysis of data and synthesis of information to provide valid conclusions	100.0	90.0
Teaching Engagement Scale Dimension (D)	Max. out of 5	
D1 - Subject/knowledge contextualization	4.5	4.6
D2 - Supportive Learning Environment	4.5	4.6
D3 - Impact to student achievement/learning outcomes	4.5	4.3
D4 - Provision of appropriate feedback	4.4	4.6
D5 - Use of relevant learning technology	4.4	4.3
D6 - Attention to affective attributes	4.6	4.6
D7 - Use of research to inform teaching	4.5	4.6

The correlation between D1, D2 and D4 reflect on the PO2 improvement significantly makes the students to apply learning through an unlearn way, that merits to the success. Saying so, equally the drop on PO1 and PO3 relate to the D3 and D5 contribute due to the absence of the lab resources. On a comparative level, the increase in PO2 significantly is a measure towards the value coefficient of resilience in reinforced learning conditions, which is critical towards the new normal work environment.

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DEVELOPING AND VALIDATING A MODEL FOR THE IMPLEMENTATION OF REUSABLE LEARNING OBJECTS: IMPACT AND PERSPECTIVES IN TEACHING AND LEARNING OF HEALTH SCIENCES CURRICULUM.

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Highlights: A systematic, practical and tested approach for the development and implementation of reusable learning objects (RLOs) is presented. The model incorporates elements of educator-learner engagement and collaboration, followed by content development, implementation and evaluation supported by strong pedagogical principles such as independent, flexible and self-directed learning. Student-centered, rich and effective learning was achieved as evidenced by qualitative comments and improvement in knowledge scores of the educators and learners involved. The model also creates an environment of continuous improvement in teaching and learning activities as well as e-Learning approaches and tools.

Key words: Reusable learning object; implementation model; student-centered learning.

Introduction

Advancement in information and communication technology has provided immense opportunities in every aspect of life. However, its use and benefit in the education sector has been hampered due to several barriers including the lack of appropriate model for successful integration and implementation. In this paper, we present a model for implementing reusable learning objects (RLOs) for teaching and learning in a higher education environment.

Description of innovation and impact

This model provides a systematic approach for educators and learning technologist in higher education institutions who intend to develop and implement RLOs in an existing or new curriculum (Figure 1).
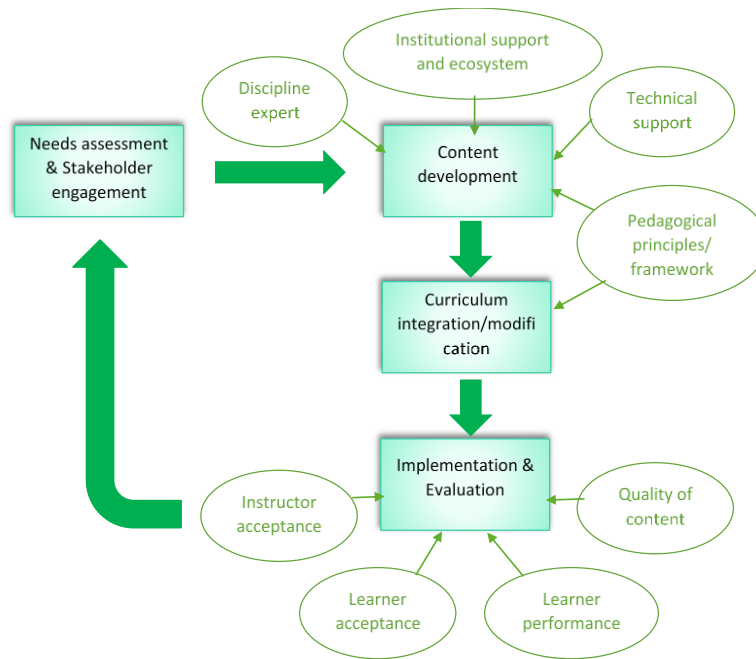
Figure 1: A model for the implementation of reusable learning objects for teaching and learning in a higher education environment.

The process was initiated with a participatory approach by conducting a need assessment exercise with educators and students which also served as an engagement opportunity to facilitate their acceptance and use of the RLOs (Hassan et al., 2020). At this stage, input from educators and students were gathered to identify sections of the curriculum for which RLOs were deemed suitable and necessary. This was followed by RLO development guided by the ASPIRE framework, supported by institutional ecosystem as well as technical expertise and input from subject matter experts. The ASPIRE framework utilizes a co-creation principle in which educators and students design the RLOs in a collaborative and iterative manner (Taylor, 2019).

Subsequently, curriculum modification was undertaken for the integration of the developed RLOs considering relevant pedagogical principles. Among the aspects considered were relevancy and appropriate placement of the RLOs in the curriculum with the aim of facilitating and enhancing learning. This was followed by an implementation phase in which process and outcome measures including educators' and learners' perception, learners' performance and the quality of content were assessed. Findings were presented back to the stakeholders to further improve the quality and process of the developed RLOs at the same time validating the proposed model.

This innovation was a product of the development, implementation and evaluation of five RLOs on the use of pharmacotherapy for smoking cessation, overview of body metabolism in different physiological conditions, as well as distinguishing various types of DNA repair mechanisms within the Pharmacy and Biomedical Sciences curriculum at the Faculty of Health and Medical Sciences of Taylor's University. Our analysis showed that both educators and learners found RLOs useful for their teaching and learning due to its simplistic, interactive, flexible and engaging nature. Additionally, the educators identified that the RLOs promoted independence and self-directed learning by students. The learners highlighted that the RLOs were easy to use, interesting and facilitated understanding. The RLOs incorporated self-assessment questions which further enhanced students' learning and understanding of the topic. This was translated into positive learning outcome attainment as demonstrated by improvement in knowledge score before and

after implementation of the RLOs (Table 1). Retention of knowledge acquired was also demonstrated 6-weeks post exposure to the RLOs.

Table 1: Evaluation of learners' performance before, immediately after and 6-weeks post RLO use within the health sciences curriculum at Taylor's University.

RLO topic	Knowledge scores out of 10 (n [%])		
	Pre-RLO use	Post-RLO use	6-weeks Post-RLO use
Smoking cessation	5.50 n = 58 [96.7]	9.08 n = 43 [80.0]	7.75 n = 54 [90.0]
DNA repair	5.35 n = 37 [97.4]	8.88 n = 34 [89.5]	8.21 n = 19 [50]
Body metabolism	7.96 n = 69 [84.1]	9.74 n = 54 [65.9]	8.78 n = 30 [36.6]

RLO – reusable learning object

The key benefit of this RLO implementation model is it provides a systematic, practical and validated solution to educators and higher education institutions embarking on e-Learning strategies with the ultimate aim of promoting student-centered learning. The model incorporates sound pedagogical framework and principal such as teacher-student collaboration and shared expectation in knowledge creation, self-directed learning as well as self-evaluation. The needs assessment and co-creation processes allow learners to be transformed to see issues from both the epistemological and ontological view of knowledge that incorporates knowing, doing, and being. The model also creates an environment of continuous improvement for both teaching and learning activities as well as e-Learning approaches and tools.

The RLO Implementation model also demonstrated that early and careful consideration of implementation strategy is crucial for successful e-Learning initiatives in higher education environment. While this model was developed and validated in health sciences curricula, it can also serve as a template to be replicated and transferable to other disciplines.

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REDESIGNING BIOMEDICAL SCIENCE PRACTICUM TOWARDS A NEW FRONTIER

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Highlights: Due to COVID-19 pandemic, a significant percentage of Biomedical Science graduates will not be able to access Malaysian hospitals for their clinical placements in 2021-2022 and this will have a negative impact towards the students' training skills and will be impacting Malaysian healthcare system in the coming years upon graduation. Hence, an alternative virtual pedagogy for Biomedical Science clinical placement using simulation based e-learning method was implemented. Through this model, students were able to effectively experience clinical placement, albeit it being conducted virtually.

Key words: virtual practicum, flexible learning, biomedical science.

Introduction

The fallout from COVID-19, continuing advances in digital technology, and intensifying pent-up demand for student centered learning have combined to present an unprecedented opportunity to transform education across the systems. Flexible learning is accessing education in a way that is responsive in pace, place and/or mode of delivery which provides an environment of continuous improvement and more flexibility (Stacey & Gerbic, 2009). It can include: using technology to provide remote or online study, work-based learning and employer engagement (Higher Education Academy, 2016). This model has been demonstrated that encourages students to take responsibility for their own learning and to engage more actively in the learning process increases their learning outcomes (Stacey & Gerbic, 2009).

In view of the rising concerns about the spread of COVID-19, a growing number of tertiary institutions have shut down in regards to face-to-face classes globally. This makes flexible learning seem a necessity in times of lockdowns and social distancing (Abisado et al, 2020; Ali, 2020; Rahiem, 2020). Similarly to the hospital laboratory placement, a significant percentage of Biomedical Science students were not able to access Malaysian hospitals for their clinical placements in 2021 and therefore, we are introducing the first of its kind virtual practicum to transform Biomedical Science practicum into a new frontier.

Content

Biomedical Science Practicum is a compulsory module under the Programme Standards: Medical and Health Sciences (2016) as a partial fulfillment for the Bachelor of Biomedical Science (Hons.) graduation. However, due to the COVID-19 pandemic, most of the national hospitals were prioritising COVID-19 cases which resulted in reduction of number of students allowed for practicum attachment. In this paper, we have proposed and implemented a revolutionary Biomedical Science practicum which has been completely redesigned in a virtual environment without compromising the learning outcomes. In summary, students will be rotated in different laboratory departments simulating an actual hospital laboratory rotations with different intended outcomes including acquisition of discipline specific knowledge, collaboration, communication and more importantly, experimental methods and laboratory practices that empowers students to translate virtual observations into interpretations which is similar to an actual clinical placement in hospitals.

In our Biomedical Science e-practicum, four major departments were designed namely i) Biochemistry/Serology/Molecular Biology, ii) Histopathology and Cytopathology; iii) Blood Bank and Haematology; iv) Microbiology. These departments were derived from a thorough analysis of actual student logbooks and were prioritised based on the number of frequencies where Biomedical Science students were commonly assigned.

To achieve the intended learning outcome of Biomedical Science e-practicum, a variety of online teaching-learning and assessment activities were adequately curated and undertaken in accordance to programme standard guidelines, and student learning time. Selected online TL which include videos, live stream lectures, articles, and Standard Operation Procedure (SOP) from Ministry of Health Malaysia were included. The introduction of SOP also enables students to understand the level of hazards associated with laboratory work as well as to follow safe practices in the normal hospital settings.

These learning materials were reinforced with various activities, such as simulations, case-based studies, hands-on home laboratory experience and other virtual laboratory tools (eg: Labster) to increase student knowledge and understanding as they facilitate active, enquiry-based learning. Video-based activities provide a step-by-step overview of a real laboratory procedure that enables students to visualise the whole experimental process and its environment through a video (Gamage et al., 2020). Strong emphasis was placed on ensuring students understood the theory and execution of these techniques. Furthermore, students able to gain experience in analysing and interpreting incorrect or uncharacteristic data using the simulated patients' scenario. Nevertheless, our team does realise the importance of actual engagement with real-life scenarios and have implemented synchronous meetings with external panelists from hospitals to share or troubleshoot real-life experience in an actual hospital setting.

As attainment of affective domain is challenging in a virtual environment, online video-log (Vlog) and daily activities logbook were used as part of the assessment to ensure that students were able to learn and reflect on the activities. Some of the notable qualitative feedbacks from students' include "This practicum has equipped me with helpful theories...", "Although E-practicum is still lacking when compared to the physical practicum, it's undeniable that I gained a deeper understanding of the theory behind the tests through various online activities".

In conclusion, we envision that the Biomedical Science e-practicum can be applied for the teaching of Biomedical Science related courses using simulated laboratory settings where students

can be exposed to hospital settings prior to their clinical placement as well as can be scalable to other health science related programmes.

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VIRTUAL SUPPORTIVE SUPERVISION FOR CHEMICAL PLANT DESIGN

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Highlights: A virtual supportive supervision framework allows project commencement, supervision, and progress monitoring to be c arried out remotely via virtual platform. Besides, the execution of this framework during pandemic ensure student assimilat ing knowledge through virtual interaction with supervisor and exchang e of information via cloud sharing.

Key words: Supportive, supervision, project -based, processing plant, COVID -19

Introduction

The outbreak of COVID -19 has c aused severe impact to the world (Asita, 2020). In 2020, Malaysia implemented Movement Restriction Control (MCO) which brought huge impact to the country's economy and its educational system. Higher education is one of the severely affected area due to the cease of physical activities on campus. Pre COVID-19 university emphasizes on the phys ical educational system and learning via lecturer -student interactions (Valarie et al., 2020). The implementation of MCO called for universities closure, resulted in the cessation of all physical university activities such as lecture, tutorial, laboratory experiment, project, and supervision (Shahzad et al., 2020).

Generally, chemical plant design involves designing a chemical processing plant that process raw materials to useful products. The process of chemical plant design includes problem definition, process synthesis, and process design and process analysis. It requires troubleshooting, design thinking and design analysis skill throughout the development of the processing plant. Conventionally, physical team meeting and discussion were held to allow idea communication, exchange of knowledge and commencement of project.

Undoubtedly, the prolonged nationwide and university lockdown has resulted in difficulties for the project commencement. There is a need for the project supervision to be shifted from traditional framework to virtual platform to ensure the continuity of the project and supervision. The transition is necessary to ensure continuation of learning process and completion of the project.

In this work, a virtual supportive super vision framework is proposed to provide a reference for project supervision to be transit to virtual platform. This framework allows smooth transition and commencement of project to be conducted virtually whilst maintaining the quality of the work.

Background

Chemical process plant design is prevalently conducted through multiples physical meetings and discussions throughout the entire design process. This allowed smooth communication of information, monitoring workflow, and ensuring the quality of work done. The transition of these processes to virtual platform poses challenges which it requires certain level of technic al understanding (Shahzad at al., 2020). This framework provided a written reference guideline for the transition approaches that are feasible based on our experience. The virtual supportive supervision has been utilized for the supervision and project monitoring during the MCO semesters. The implementation of the virtual supportive supervision framework has gained positive feedback from students' engagement and positive outcome in the curriculum quality during the challenging transition.

Mapping Uniqueness towards Educational Needs

Figure 1: demonstrated the framework of the virtual supportive supervision which highlighted the outcome at each stage of the chemical process plant design. At each plant design stage, student progress is closely monitoring to ensure meeting the milestone at the respective dateline.

Conceptual Stage
Process Synthesis and Integration
Process Simulation
Equipment Design

P&ID and Risk Analysis

Economic Analysis

Figure 1. Outcomes of the virtual supportive supervision for chemical process plant design in 2020

Table (Fixed Capital Cost / CAPEX)

Component	Percentage of FCI (%)	Estimated Cost
Fixed Capital Cost = Total direct plant cost + Total indirect plant cost		
Direct Costs		
ISBL		
Purchased equipment (PCPE)	100	RM27,036,693.71
Delivery of equipment	10	RM2,703,669.37
Purchased equipment installation	39	RM10,544,310.55
Instrumentation and controls	26	RM7,029,540.36
Piping	31	RM8,381,375.05
Electrical system	10	RM2,703,669.37
OSBL		
Buildings	29	RM7,840,641.17
Yard improvement	12	RM3,244,403.24
Service facilities	55	RM14,870,181.54
Total direct plant costs	312	RM84,354,484.36
Indirect Costs		
Engineering and supervision	32	RM8,651,741.99
Construction expenses	34	RM9,192,475.86
Contactor's fee	19	RM5,136,971.80
Contingency	37	RM10,003,576.67
Legal expenses	4	RM1,081,467.75
Total indirect plant costs	126	RM34,066,234.07
Fixed Capital Cost		RM118,420,718.43
Variable Capital Cost		
Working capital		RM1,331,469.56
Total Capital Cost = Fixed Capital Cost + Variable Capital Cost		
Total Capital Cost		RM119,752,187.99
Total CAPEX Cost = Total Capital Cost + Plant Site Location Cost		
Plant site location cost		RM1,081,467.75
CAPEX Cost		RM120,833,655.74

REVENUE (GROSS PROFIT)

Product	FR (ton/year)	Unit Cost (RM/ton)	Total (RM/year)	Ref
CH_4 (99.9 wt%)	937.57	8,351.50	7,830,116.87	–
H_2O_2 (35.0 wt%)	911.04	30,000.00	27,331,128.00	–
Total Revenue (RM/year)			35,161,244.87	–

OPEX — VARIABLE OPERATING COST

Raw Material Cost

Raw Material	FR (ton/year)	Unit Cost (RM/ton)	Total (RM/year)	Ref
POME	308,128.63	0.00	0.00	–
$Fe_2(SO_4)_3$	26.85	812.00	21,801.23	–
CO_2	9,580.59	200.00	1,916,117.28	–
Air	6,000.67	0.00	0.00	–
H_2O	222,694.32	1.67	371,899.52	–
Total Raw Material Cost (RM/year)			2,309,818.02	–

Utilities

Utilities	Parameter (unit/year)	Unit Cost (RM/unit)	Total (RM/year)	Ref
Electricity (kWh)	1,980,000.00	0.337	667,260.00	[1]
Water (m^3)	221,760.00	1.61	357,033.60	[2]
Total Utilities Cost (RM/year)			1,024,293.60	–

FIXED OPERATING COST

Labour Cost

Salary (RM/labour)	16.00	Average Chemical Engineer	[3]
No. of shift	3	Include sick leaves and holidays	[4]
Hour/week	40		
Week/year	52		

Unit Operation	Labour/unit.shift	No. of unit (unit)	Total (RM/year)	Ref
Semi batch Reactor	1.0	1	99,840.00	[5]
Continuous Reactor	0.5	2	99,840.00	[5]
Process Vessel	0.2	6	119,808.00	[5]
Total Labour Cost (RM/year)			319,488.00	–

Miscellaneous Cost

Miscellaneous Cost	Formula	Total (RM/year)	Ref
Maintenance	5% ICC	1,703,311.70	[5]
Operating Supplies	10% Maintenance	170,331.17	[5]
Laboratory Charges	10% Labour Cost	19,251.20	[5]
Supervisors	10% Labour Cost	19,251.20	[5]
Taxes	2% ICC	681,324.68	[5]
Insurance	1% ICC	340,662.34	[5]
Total Miscellaneous Cost (RM/year)		2,934,132.30	

General Expenses

General Expenses	Formula	Total (RM/year)	Ref
Administrative Cost, Marketing & Distribution, R & D Cost	18% Total OPEX	1,400,000.00	[5]
Total General Expenses Cost (RM/year)		1,400,000.00	

SUMMARY OPEX

TOTAL VARIABLE OPERATING COST (RM/year)	3,334,111.62
TOTAL FIXED OPERATING COST (RM/year)	4,526,644.30
TOTAL OPEX (RM/year)	7,860,755.92

Advantages and Value Coefficient

The implementation of v irtual supportive supervision allows effective information and knowledge exchange between supervisor and students. The utilization of virtual platforms in the supervision process provide full rounded learning experience to students and speedy exchange of information and knowledge allows students to gain broad spectrum of knowledge .

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THE DIGITAL EXEMPLAR KITCHEN: LEADING CHANGE FOR CLASSROOM FROM CORPOREAL TO VIRTUAL

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Highlights: In the School of Food Studies and Gastronomy (SFSG) and Taylor's Culinary Institute (TCI), the academic leadership, revolutionized the delivery of learning in culinary modules to ensure business as usual during a full or partial lockdown such as during the COVID-19 pandemic. The Digital Exemplar Kitchen Project brings seamless and engaging experience between the students who are in campus with their chef lecturers (chefs) as well as those students who may be held back in their home state or countries. The 'pandemic pedagogy' may no longer be a temporary measure in the future once classes can be borderless.

Key words: *Pandemic Pedagogy, Borderless Learning, Culinary Arts*

Introduction

Universities globally began the frantic switch to full-fledged online learning while the COVID-19 pandemic escalated without any promising solution in 2020. The word 'Pandemic Pedagogy' became increasing popular, started as a Facebook group to support education providers navigate through the uncertainty of the pandemic (Schwartzman, 2020). At Taylor's University, the idea of learning to be conducted entirely online was thought of since 2018, under the new Taylor's Curriculum Framework (TCF) two years before the COVID-19 pandemic struck worldwide in 2020 (Lessler, 2018). Under this TCF, a campus-wide curriculum aims to move learning online is being guided by the TCF Policy and the e-Learning Strategic Plan.

Background

The initial objective of the e-Learning Strategic Plan was not only to enrich and complement face-to-face learning, but also to prepare for a time during emergency period, so that business can continue as usual amid a partial or full lockdown of the university (Nair, 2020). The COVID-19 outbreak ultimately paved the way for innovation in subject delivering which was the Digital Exemplar Kitchen (DEK). The DEK addresses the needs of students who were held back at home to experience learning with their counterpart on campus. This innovation allows the chefs to create a learning environment that is interactive and happen synchronously with students.

Purpose, Methods, Results

During the 2020 lockdown, the academic leadership transitioned rapidly to fully online, and students can no longer have their practical experience in the kitchens. The challenge surfaced in keeping SFSG and TCI students excited about learning online. The chefs brainstormed ideas on incorporating interactive demonstrations at a distance. Effective known methods to manage online classroom includes (1) Social presence, (2) Facilitate discussion, (3) Supporting students, and (4) Live online teaching (Ni She et al., 2019). With disruptive technologies like Zoom, chefs conduct virtual cooking demonstrations and facilitate discussions with the students. However, there were still limitation with having limited devices to stream the cooking demonstrations from the campus.

The DEK focuses on delivering high quality multimedia with interactive engaging moments with the chefs. The classes are streamed live from the kitchen using online meeting platform. The camera view will be changed according to the movement of the chef which ranges from the working table to the cooking range, and oven area. With the DEK, students attend live session with a 2-way communication whilst the session is also recorded to resolve the time zone difference for international students.

For online classroom management, chefs engage with students with a wide array of pedagogical methods. For example, miniature tasks to test them formatively based on the menu of the day, were given to students to keep them concentrated throughout the session. Upon completion, the session is immediately uploaded to a video management system (VMS) i.e., Panopto that allows students to re-access ubiquitously.

The DEK is a culmination of high-speed internet connection, online platforms as well as disruptive educational tools. Other than Zoom, Panopto, and the hardware installed, the same learning management system (LMS), TIMeS (Moodle) was utilized as the personal learning environment (PLE). A VMS using Panopto was integrated to make the video storing efficient for the end-users. The recordings uploaded into Panopto allows for a greater engagement with students to interact with their chefs about the instructional videos.

The hardware comprises of 42' TV for display; 8' Full HD Mini Monitor panel facing the curator as to allow the chefs to observe what he is doing and what the student is viewing; Two (2) fixed HD camera pointing at a precise angle for maximum view with One (1) omnidirectional HD PTZ (Pan-Tilt-Zoom) camera that allows the curator to adjust, zoom in or out where necessary and allowing the chefs to have 10 different preset camera views and a Jabra headset with noise cancellation to ensure pristine audio delivered to the audience making the chef easy to be heard with high-definition sound quality to both ends.
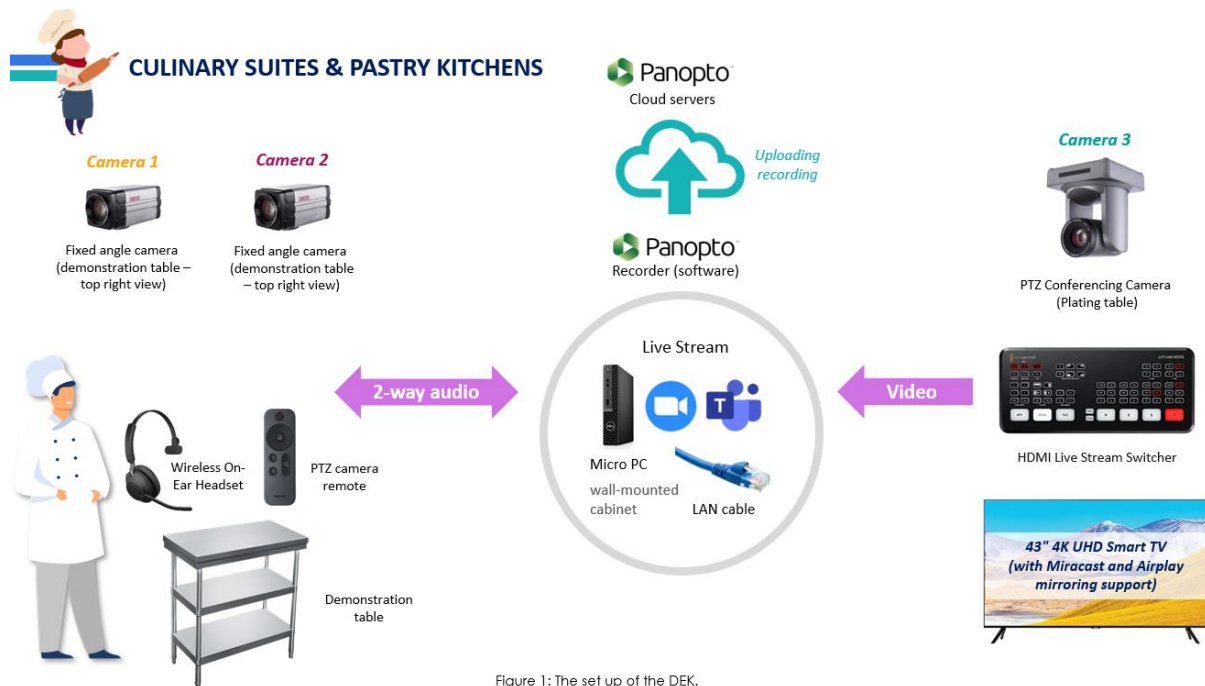
Figure 1: The set up of the DEK.

The socio-emotional learning process is somewhat hampered in an online classroom (Zahra Khusnul Lathifah et al., 2020). This DEK innovation was introduced to improve the socio-emotional learning process when the students' motivation was at an all-time low. After the DEK was installed, the student's self-motivation was on the rise and reignited their passion for culinary. The DEK is monitored closely for improvement based on the end-user's feedback. Students' review was positive as they were able to interact with peers and chefs in real time as in F2F classroom.

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DESIGNING INTEGRATIVE BIOTECHNOLOGY LAB EXPERIENCE THROUGH A BLENDED AND FLEXIBLE LEARNING APPROACH

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Highlights: COVID-19 pandemic and nationwide lockdown significantly impacted students access to lab classes. This paper describes how technology-enhanced learning is delivered and assessed to support blended and flexible learning approach. The transition of hands-on Biotechnology lab practical to fully online delivery and assessment can offer new opportunities for flexibility in learning. Synchronous and asynchronous forms of student support were offered, including videos, simulated data for analysis and online "gamified" virtual lab simulation. Students responded positively to the transition, with feedback showing that gamified virtual lab simulation created a more engaging and effective learning environment.

Key words: biotechnology, virtual lab simulation, flexible learning, blended learning, student engagement, simulated data

Introduction

Practical lessons and lab work represent an important area of learning, especially for biotechnology students because the hands-on integrative experience would allow them to link theory to practice, (Walkington, Pemberton and Eastwell, 1994). The pandemic-induced remote or hybrid delivery of typically very hands-on laboratory courses present a unique challenge for biotechnology educators. Besides, the experience of physically being present in the laboratory environment and picking up the requisite hand-on psychomotor skills is far more challenging to replicate remotely.

This paper aimed to design integrative biotechnology lab experience through a blended, flexible and personalized learning approach throughout the COVID-19 pandemic lockdown in year 2020. Blended and flexible learning approach is introduced in three modules (Introduction to Microbiology, Bioprocess Technology and Animal Biotechnology) to provide students with more control over the time, place, pace, and path of their learning. Students were provided either with raw data or computational model that generate realistic data that they could analyse. However, video demonstrations followed by data analysis are unlikely to engage students in the culture of working in a lab. Therefore, virtual lab simulation (Labster) has also been introduced in all three modules. The simulation is an immersive and interactive digital environment designed to facilitate learning of key concepts and techniques. The simulation allowed the user to work through the procedures in a virtual lab by using and interacting with the relevant lab equipment and the essential content is taught through an inquiry-based learning approach (Allen and Barker, 2021). Students have accessed virtual labs that consists of 3D simulated environments with guided activities demonstrating lab safety, cell culture, gram staining bacterial isolation, fermentation, CRISPR.

Labster simulation is a type of technology-enhance learning and this type of e-learning is concerned with using computer technologies to support learning, whether that learning is local (on campus) or remote (at home or in the workplace). Thus, flexible pedagogies and technology may be considered natural partners – flexible learning can be provided by and supported through technology, while conversely, technology can encourage flexible approaches to the delivery and assessment of learning.

The virtual simulation was implemented as part of the formative assessment of practical component for the modules. Our data showed that, there is a significant improvement on overall students' performance in the practical assessment component following the transition to online instruction. In addition, students have expressed positive comments such as the ability to practice specific steps for multiple times and performing the experiments at their own pace. Many have commended that the graphics and animations were realistic, gamified, and depicted as real-life.

It is reasoned that simulations have specifically been shown to be effective for blended and flexible learning when sufficient guidance is given (Lazonder and Harmsen, 2016). The simulations used in this study provide guidance in the form of concrete instructions by a pedagogical agent, to ensure that students progressed smoothly through the simulation activities. We argue that when a virtual context is developed in a way to achieve enough psychological presence, students will perceive the virtual environment to be their primary learning context. (Makransky, Wismer and Mayer, 2018). It is undeniable that virtual laboratory simulations will continue to play important roles in the Biotechnology curriculum. Future research efforts in understanding students' prior knowledge and motivational drivers will be essential in the optimal incorporation of virtual laboratory simulation in the Biotechnology curriculum.
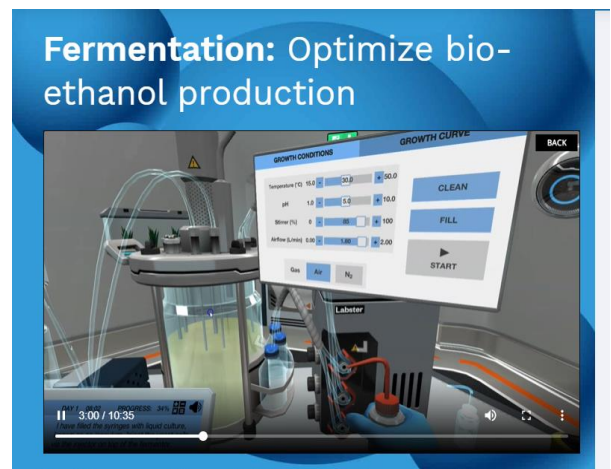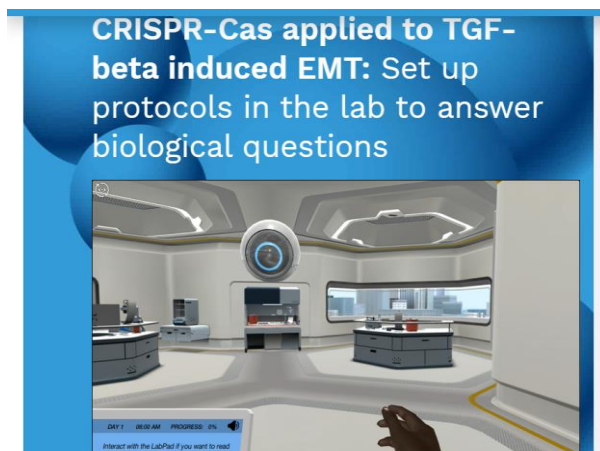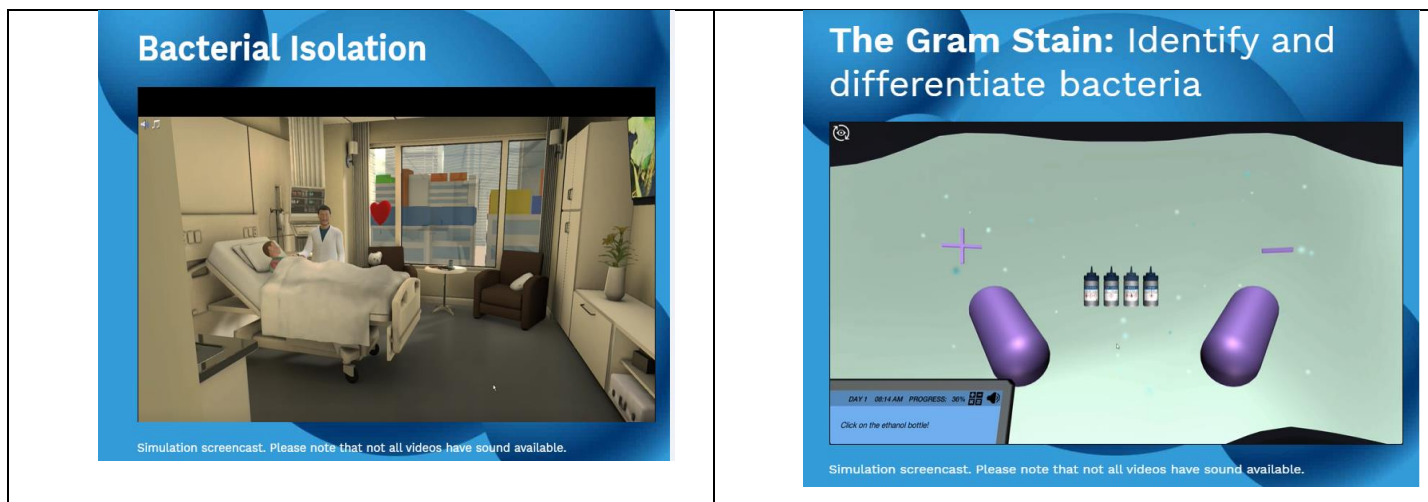
Figure 1: Blended and flexible learning by adaptations from the Labster simulation for the practical of gram stains, bacterial isolation, fermentation and CRISPR

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DIGITALIZING CALCULUS CLASSROOM WITH INNOVATIVE REVIEW AND FEEDBACK SYSTEM IN CREATING IMPACTFUL STUDENTS' LEARNING.

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Highlights: The shift from physical face-to-face learning to virtual learning in higher education institutions has become a necessity after the outbreak of COVID-19 pandemic. Therefore, it is crucial to create an innovative virtual classroom to maintain and enhance students' learning at this unprecedented time or in future. This study is to explore and investigate the use of innovative review and feedback system in teaching Calculus at virtual classroom. A few interesting technological platforms such as Miro, Zoom and Moodle are used to create and support the review and feedback system. Board in Miro enables instant "live" sharing and discussion among lecturer and students. Recording in Zoom helps lecturer to digitize the class for students' reviewing after lesson. Homework in Moodle provides automated feedback to students after their attempts. The integration of the review and feedback system in Calculus class assists to close the knowledge transfer and communication gap in virtual learning.

Key words: *feedback, Miro, review, Zoom, Calculus, Moodle.*

Introduction

The advancement in information and communication technology has led to the emergence of virtual classroom as an alternative or supporting medium for teaching and learning activities in schools and universities. Due to the COVID-19 pandemic, virtual classroom has now become a need as it allows the students to learn at their convenience at home without attending classes physically at universities (Knibel, 2001). However, there are still many limitations of virtual classroom in comparison to traditional classroom.

Traditional physical face-to-face classroom is still vastly used as a medium to share knowledge among teachers and students worldwide before the outbreak of COVID-19 pandemic. This is due to the information delivery and communication within a traditional classroom is more direct with less barrier and interruption. Although virtual classroom can now be conducted "live" or synchronously similar as in traditional classroom, teachers are still unable to monitor and communicate effectively with the students. This is because virtual classroom is still bounded by distance, space, time, and internet connectivity. Therefore, the utilization of technological platforms such as Miro, Zoom and Moodle is important in addressing the shortcomings in virtual classroom, thus support and strengthen the virtual course delivery with this innovative review and feedback system.

Content

Learning Calculus requires focus viewing and understanding on details and precise mathematical solution steps, consistent and multiple practices in solving mathematical questions and constant mistakes correction and readjustment during exercises based on feedback received. The effective execution of these requirements will eventually lead to the mathematical problems solving skill mastery by the students. Therefore, the review and feedback are regarded as inevitable elements for impactful students' learning within a computational course, like Calculus.

In this study, a review and feedback system known as "ASAS" – Asynchronous-Synchronous model was developed. This model centered on the use of Miro's collaboration board, Zoom's recording system and Moodle's digitalized homework in Calculus module. This study provides insight of using these technological assisted tools in Calculus virtual classroom and its impacts on students' learning.

"ASAS" is an iterative review and feedback system, which consists of content review (Asynchronous), live feedback (Synchronous), exercise feedback (Asynchronous) and consultation feedback (Synchronous). Before "ASAS" is started, students have undergone pre-recorded lecture and "live" lecture to learn from the teaching content in Calculus. The chance of students in losing focus and missed grasping details mathematical solution steps is higher from a "live" lecture in a virtual classroom compare to a traditional classroom. This is because it poses higher probability of distraction and interruption occurrence in a virtual classroom due to the separation in distance, space and time among lecturer and students. Therefore, "ASAS" has come into place to address the students' learning needs by providing them with the video recording using Zoom after each "live" lecture session. In this first stage (Asynchronous), Calculus students can review the mathematical solution steps which they did not able to fully grasp during the "live" lecture whenever it deemed necessary. Utilizing the recording feature in Zoom helps lecturer to digitize the lecture for students' reviewing after lesson, thus support and strengthen their understanding on the mathematical solution steps.

The second stage (Synchronous) is the live discussion and feedback session using Miro collaboration board together with Zoom meeting room. In traditional classroom, students show and share their mathematical works on paper and whiteboard when is required by the lecturer. Hence, lecturer provides feedback (verbal + visual) on the paper/board in the class. The use of web-based Miro collaboration board in a Zoom's classroom mimics the teaching and learning process as in a traditional classroom. Students upload their works on Miro's board, thus lecturer feedback by explaining and annotating on the board. Miro's board enables instant "live" annotating on the mathematical solution steps for both parties and it creates effective discussion among themselves. Students appreciated the individualized feedback (Murray, 2011) and they learn from the discussion and feedback session using Miro and Zoom.

The third stage (Asynchronous) is the exercise feedback in Moodle. Calculus students are required to attempt a series of exercises to master their mathematical problem-solving skill. The given multi-level exercises in Moodle provides immediate auto-generated feedback and unlimited attempts. In this approach, equal learning opportunities are given to students with different levels of skills (Bringula et al., 2017; Wasfy et al., 2013). Students appreciate to receive prompt feedback after each attempt, and they can readjust their solution to obtain correct answer eventually. The fourth stage (Synchronous) is the consultation feedback using Zoom and Miro as in the second stage. However, this is done in one-to-one basis if individual student needs further clarification and help from the lecturer. An effective discussion can be carried out using Miro's collaboration board and Zoom's meeting.

The implementation of "ASAS" with the use of Miro, Zoom and Moodle is expected to strengthen students' learning and preserve the teaching and learning goals as in a traditional classroom. This innovative review and feedback system amplifies students' learning experience in a Calculus virtual classroom.

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REIMAGING SERVICE LEARNING DURING THE COVID-19 PANDEMIC THROUGH DIGITAL TECHNOLOGIES

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Abstract: Service learning is a form of experiential education in which students engage in activities that address human and community needs with structured opportunities intentionally designed to promote student learning and development. During the COVID-19 pandemic, a great number of service-learning programmes in higher education institutions had to be suspended or postponed due to the transition of academic courses to online instruction. Rather than suspend, postpone, or cancel service-learning in this unprecedented and uncertain time, Taylor's University Food Science programme explored an innovative model known as S.E.R.V.E (Study; Establishment; Realization; Valuation; Expression), which constructed service-learning through various digital platforms. Students first need to conduct a needs analysis, based on the findings students are required to construct an approach, material or strategy necessary to solve the identified problem. Next, students are required to carry out the project and evaluate the feasibility and effectiveness. The service-learning project will be assessed and finally students can evaluate themselves through reflections to examine what they have carried out. The developed model shows way on how students can perform their volunteerism in the virtual world that is not meant only to help community organizations, but also meant to advance students' individual academic goals. The pandemic has amplified advantages of virtual service learning, where students felt the sense of belonging to the community. The S.E.R.V.E. model finds a way for students to express their appreciation and pay it forward in the community. This model brings some benefits that address the limitations of on-site service learning, and may provide some insights for educators and administrators facing the dilemma in constructing service learning during this pandemic.

Key words: COVID-19; service learning; virtual; S.E.R.V.E. model; digital technologies

Content: When the emergence of COVID-19 pandemic accelerated a pivot to remote learning, the higher education institutes face the challenges of transitioning service-learning programmes that are experientially based to predominantly classroom-centered learning. Food security, preferences, systems and policies influence the health of individuals and communities both directly through food consumption choices, and indirectly through environmental, economic, and social impacts. To aid student understanding of these complex determinations of food choice, a student-driven, community-engaged service learning is usually practiced in the Food Science programme. While service learning typically involves students applying their knowledge and learned skills to help satisfy an expressed community need, the recent shift to online learning has caused dilemma among the educators and administrators to pursue this pedagogy. With that, Taylor's University Food Science programme academic had to think creatively to enable an online teaching practice that can re-imagine and prioritize community engagement during and after the COVID-19 pandemic.

This project showcases an innovative S.E.R.V.E. model in facilitating service learning through virtual service opportunities and usage of digital technologies that can help students to develop cross-cultural knowledge and build a positive relationships with the community. A more engaging context through the use of digital platforms was found to be more effective in generating transformational experiences as suggested by Singleton (2015). Such changes are especially relevant in the context of lifelong learning which integrates the S.E.R.V.E model through the use of digital platforms as e-Learning tools, which eventually benefits the Food Science students, faculty members, and community as a whole. S.E.R.V.E. model can be split into five stages:

1. Study: The type of service learning will be circling around indirect service, community engaged research and advocacy/public awareness projects. In this stage, students are required to conduct a needs analysis to identify an issue using various online resources such as Moodle, Youtube video, e-book, online articles, and social media.
2. Establishment: Based on the needs analysis, students will develop a blueprint as well as instruments needed via digital mind map such popplet, zoom, teams, concept board or miro to address the identified issues.
3. Realization: Students will carry out the project. At this stage, student engage and develop strong relationships and a sense of responsibility for their communities while maintaining safe distances with the community partner. Community engagement will be performed through non-direct contact while preserving human connection through online platforms such as teams, whatsapp, screencast-o-matic, powtoon and kinemaster.
4. Valuation: Students will be assessed virtually based on their proposal, oral presentation, video presentation, report, and product showcase to measure their achievement. Rubrics are provided to guide students on the degree of which a specific learning outcome has been achieved.
5. Expression: Students will reflect and evaluate the meaning of their service-learning experience and the connections they have made.

Service Learning uses community service as the vehicle for the achievement of specific academic goals and objectives (Sandaran, S. C., 2012). In this regard, service learning is different from regular community service. It is tied to academic goals and curriculum, and explicitly encourages students to reflect on their experiences while community service does not. The S.E.R.V.E model gives students experiential opportunities to learn in real world contexts and develop skills of community engagement, while using digital platforms to address community's needs. In addition, the S.E.R.V.E model supports faculty members by providing a real-world assignment to the more theoretical material discussed in the classroom. Structured reflection activities centered on student experiences, create additional opportunities for faculty members to guide student learning during the COVID-19 pandemic. Finally, increased student and faculty members participation in the community strengthens the relationship between academic institutions and their communities. Community members gain valuable human resources needed to achieve community goals that might otherwise not have the resources to undertake (Brandy 2011).

Although the main aim of this innovation is to contribute back to the community, this model also display some commercialization potentials. The online recorded/ developed video can be converted into podcasts, where anyone who is interested in the particular content can download them for a small fee or follow the podcasts through RSS subscription. Audiences are not limited to university students, as the content can be made available to anyone across the globe. In addition, the interactive The S.E.R.V.E. model can also be converted into paid educational/ service apps and adopted by corporate players/ stakeholders to implement their corporate social responsibility (CSR).

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SUSTAINABLE ONLINE PRACTICAL SESSION: A REFLECTION OF STUDENTS MOTIVATION BASED ON THE ARCS MODEL APPROACH

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Highlights: During this COVID-19 global pandemic, higher education had to go through an inevitable transition from face-to-face session to online classrooms. Educators saw disruptions, especially in the practical sessions. To encourage continuity of students' motivation during the online practical lessons, many innovations were explored to increase the students' engagement in teaching and learning. With the appropriate tools and online applications, practical lessons can be conducted online without disrupting knowledge transfer. The ARCS model was used to substantiate the impact of students' motivation during these sessions. Sustainable education of online practical sessions needs this systematic approach. The ARCS model validates the learners' motivation and caters for a sense of satisfaction that promotes learning transfer and sustainable knowledge development.

Keywords: Online practical Lessons, ARCS Model

Introduction

With the pandemic, educators were required to upgrade their digital competency skill to shift from face-to-face sessions to online classrooms. Without incorporating rich and high-quality media content and interactive learning, students will lose motivation to learn. Therefore, for a start one of the digital logic practical lesson was conducted using the Tinkercad (https://www.tinkercad.com/dashboard) application and was validated according to Keller's ARCS Model. This model substantiates the motivation among the student and encourages sustainable learnability during the online practical lessons.

Content

This systematic approach to cultivate student's motivation in learning was applied to the classroom content. The ARCS model (Keller, 1987), advocates not only stimulation but also maintaining learners' motivation and sense of satisfaction that promotes learning. The four categories of this model are Attention, Relevance, Confidence and Satisfaction. The ARCS Model tends to offer valuable assistance to educators based on the benefit observed during the practical lessons conducted. Below is the observation recorded based on the ARCS model categories.

1. **Attention**: Simulates the student's interest to learn further. Since this application is available online, it is very safe to conduct the digital circuit implementation without guidance. Unlike

in a lab, students must carry out their circuit implementation but under guidance. Although they still adhere to the rules, it is safer to test it on a virtual platform.

2. **Relevance:** Digital platforms such as Tinkercad can be used to getting familiar with the digital component without fear. Through online learning, students are given the individual opportunity due to no resource restriction. Whereas in a physical lab environment, students are working with limited resources. Updated hardware is also found in the application and this embarks interest in students to explore the components such as Arduino.

3. **Confidence:** With online application, there is room for trial and error, learning efforts at their own pace to complete the circuit implementation individually gives the students confidence and meaningful opportunity. During the face-to-face practical lessons, group work is compulsory due to resource limitations. With online simulations, students are given exclusive experience with the circuit even if they do it in a group. Free riders also can be avoided. Through online learning, the resources are not limited. Therefore, students independent learning capabilities are stimulated.

4. **Satisfaction:** The ability to experience technology competence through completing the circuit gives self-encouragement to explore more. In a face-to-face environment, students often get frustrated, not due to wrongly implementing the circuit, but this happens due to malfunction of mass-produced components such as LED, breadboard, IC and DIP switches. These will lead to painstaking troubleshooting. Using Tinkercad, students circuit simulation works the way they anticipated and gained recognition from peers intensifies the extrinsic motivation. This satisfaction gained during this enjoyable experience encourages intrinsic motivation too.

The figure shows the submission of students work on half adder circuit implementation using the 7408 and 7486 chips using Tinkercad. This rich-media application helps to motivate the students' learning outcome.
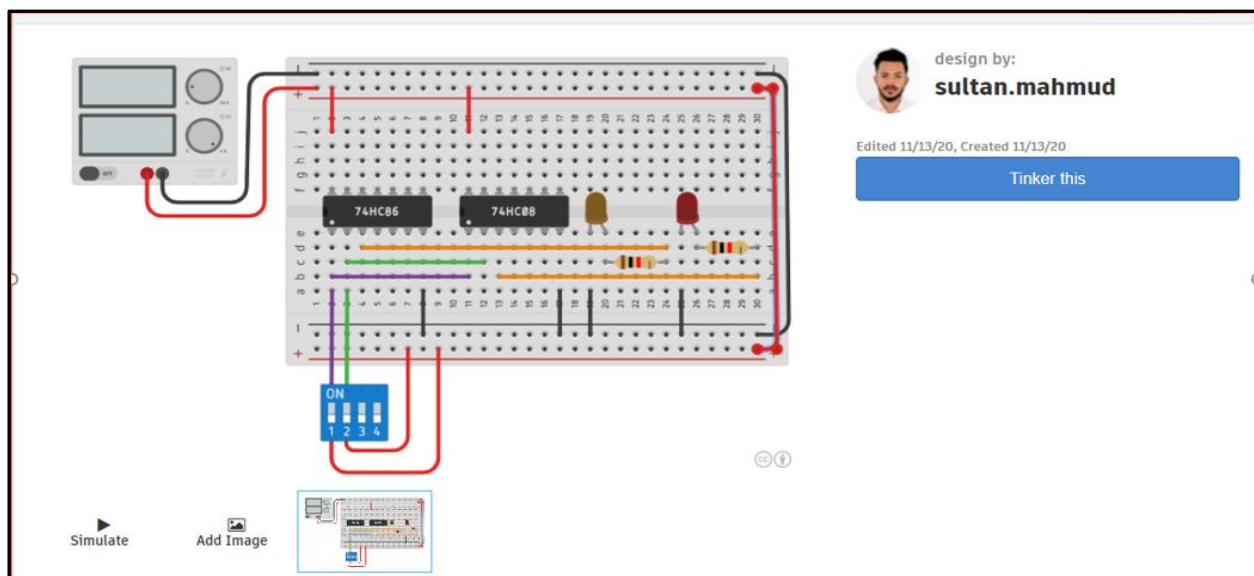
Figure 1: Simulation of Half Adder Circuit Implementation Using The 7408 And 7486 Chips.

The benefit of the online compared to the face-to-face practical lessons is shown in Table 1. With the correct application and tools online, the online practical classes can be a highly motivating

experience and cost-effective. Large labs, technician, logistics and storage can be minimized. Lesson plans can include the ARCS model to substantiate the students' motivation for the subjects that has online practical lessons. International students also have gained practical knowledge and experience. Motivation can be the driving factor to have a sustainable learning experience. This improved and enhanced balance in education can be the new norm.

Table 1: Comparison between Physical Classroom and Online Practical Class for Digital Circuit Implementation

Environment	Face-to-Face Classroom	Online learning Applications
Safety	Safety- Lab Safety rules applied and monitored till class ends	Safety- Lab Safety rules applied, and safety is assured as it is using virtual voltage and testing can be done without supervision
Simulation-Higher Voltages	Higher Voltage can cause burns and hazardous situation.	Only a virtual simulation.
Resources	Component-Not Sufficient for individual	Component—sufficient for many trial and errors
Space	Lab Space Constrain	Lab space not relevant
Logistics	Buying components	Not Applicable
Maintenance	Maintenance, storage	Not Applicable
Version	Version Update -Rasp Pi 1-4. Students are forced to use an older version	Students use updated hardware.
Malfunctions	Some bulk components are spoiled or malfunction, such as breadboard and LED.	Not applicable
Information's-Students submissions	Accuracy-Possibility of Human Error,	Accuracy is assured as applications need a login,
Group Work	Free-Riders difficult to be avoided	Free Rider avoided

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BORDERLESS - ACADEMIA. INDUSTRY. (A.I.) INTEGRATED LEARNING ASSESSMENT: MOVING THE LEARNERS FROM "ONE COMFORT ZONE" TO "GLOBAL LEARNING ZONE"

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Highlights: The recent global pandemic has propelled educators to rethink their learning cohorts by applying innovative virtual and digital strategies. The educators should build new synergies in the students learning space and one of the strategies is to redesign the learner's assessment with the integration of "Borderless - Academia. Industry. (A.I.)" which transforms the learners from their "One Comfort Zone" – teachers-centric towards the "Global Learning Zone" where the learners were assessed by global academicians and industry experts with the support of learning platforms such as zoom, MS Team or others. This new assessment approach helps the learner's community to become resilient, build 21st century skills while they share and to predict the industry transformation in future while they interact more closely with the future recruiters. Lastly, these learning initiatives improve the quality of education (SDG4) through innovation (SDG9) and borderless collaboration (SDG17) to learn from the global context.

Key words: Borderless assessment, industry-integrated assessment, SDG4, SDG17, Future Resilience Skills

Introduction

The COVID-19 pandemic impact has created a milestone in the history of education with the largest online movement of shifting the delivery approach within a short period. These sudden changes intensely reshaped the way global education is delivered as Millions of learners were affected during the closures. Globally people believe that the emergence of hybrid and new adoption of online distance learning will persist even after pandemic to widen the equality in education. (Ghada Refaat El Said, 2021). A new hybrid model of education is expected to emerge, and, given the digital divide, new shifts in education approaches could widen equality gaps. A recent study during the pandemic reported that the interruption of education in 31 countries should not only focus on the delivery as well as on the assessment methods with some innovative approaches according to the respective country context (Bozkurt et al., 2020). The current scenario opens the challenges among the university educators to rethink their assessment strategy as supportive practices to ensure the quality of education i.e. Sustainable Development Goals 4 (SDG4)by shifting from the traditional closed-books, time-limited examinations, to remote assessments. The choice of remote assessment should not be an afterthought as it may define our response to the current crisis and will affect Universities' academic standards. Students' performance, marks and final degree classification depend on assessment and we owe to set up fair assessments in line with learning outcomes (Tim Burnett and Stefania Paredes Fuentes, 2020).

With the advent of information and communication technology, educators have become increasingly interested in adapting the interactive platform to engage the student learning activities (Enriquez, 2010; Ifenthaler & Schweinbenz, 2013; Koile & Singer, 2008; Loveless, 2002). Interactive technologies, including smartphones, tablets, apps, interactive whiteboards, and classroom response systems, have generated active discussions that focus on students' learning performance and abilities (Gikas & Grant, 2013). The development of education applications (apps) have supported educators to shift their Learning pattern from traditional classroom towards the borderless and limitless classroom, whereby the students and educators communicate and share ideas across the globe (Balasubramanian. K., 2017).

The virtual and digital strategy of moving towards the borderless Academia. Industry. (A.I.) integrated learning assessment among the university students enabled the communication and collaboration between students, academicians and industry experts in different countries. This borderless assessment approach using learning technology (such as Zoom, MS Team and others) will act as a bridge to move the learners from "One Comfort Zone" to "Global Learning Zone" by bringing the global A.I. experts as "panels/jury members". This initiative will develop 21st-century competencies skills as well as become resilient in future. The pedagogical attributes of activities in borderless assessment support an engaging and collaborative learning environment. With the pandemic, it is important to embrace the campus as an ecosystem to build new synergies. Connections made beyond the campus through partnerships with local and international knowledge partners from academia as well as the industry makes learning resonant. The role of education as an engine of our communities and cities, public and private sectors have an opportunity to partner towards building new synergies between work and education, integrally working together to help communities thrive (Meghanet al., 2020).

1. Description of your innovation / product development / design / process.

As an educator, we believe that the transformation in teaching and learning always happens whenever there are any changes in generation and global impacts. Our teaching passion is to engage, collaborate and inspire the students inside and also outside the classroom environment by integrating the technology as enhancing teaching tools to have a right learning curve in all cohorts. We implemented this "Borderless – A.I. (Academia. Industry.) integrated learning assessment among our students by inviting the professors and industry experts within Asia region during this pandemic time using the "Zoom and MS Team" learning applications to make a Paradigm shift in the modules such as hospitality activity simulation exercise for the post-graduate students of Taylor's University as well as borderless teaching engagement with the another university in the Philippines as "visiting professors", we transformed their assessment towards similar concept with inclusion of "Two-module combined Assessment" on total quality management and business ethics modules of PhD students.

2. What is the context or background of the innovation / process?
   o It allows students to expand their discussion and investigation beyond the walls of the classroom
   o It provides an opportunity for educators and students to collaborate and create knowledge through interaction with a larger range of content globally by connecting through virtually and sharing the research seminar topics with the global industry experts and academicians.

- o It supports a social constructivist view of learning because it enhances students' ability to learn and apply content in context with other students.
- o The borderless assessment can be moved to a real situation environment and the lecturer uses the Zoom/MS Team app to share the information, monitor the learning space and connect with the expert members.

3. Why are they important to education?

- o Bring the World into the classroom
- o Making International Experience and knowledge accessible to all
- o Increasing Intercultural Competence and develop resilience skills
- o Bridging the curriculum and technology by closing the gap between the industry players and academic world
- o Create a collaborative learning environment and cross-cultural study space

4. Please write any advantages of your innovation / product development / design / process towards education and community.

- o Use it to collaborate with other classroom (Borderless Classroom and Assessment)
- o Enable participation for students outside of the classroom
- o Enable better collaboration for online activities
- o Virtually connecting the different stakeholders within the horizons of the education sector.
- o Bridging the curriculum and technology in a impactful and new student learning experience (SLx)

5. Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

- o Builds a stronger relationship with educator and learners globally
- o Research cluster opportunities between other institutions and industry
- o Open Learning Community – Life-long learning
- o International and collaborative Learning Opportunities

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'NOT JUST WATCH' INNOVATIVE VIDEO-BASED LEARNING FOR TODAY'S DIGITALIZED COMMUNITY

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Highlights: Video-based learning is one of the highly utilised e-Learning tools for the Online Learning Environment (OLE). Besides promoting student-centred learning video base learning also aid slow learners to repeatedly view the content to clearly understand and achieve the learning outcome. Having mentioned that, video learning can be a challenge to promote active learning. The objective to improve and achieve pedagogical effectiveness, this project aims to redesign and reimagine video-based learning to promote active learning for today's digitalized community with a focus on pedagogy.

Keywords: Video-based learning, Active learning, Student-centered learning, Online Learning

Introduction

Video-based learning has become popular and known to the global education community which is now focusing on technology-based learning in many institutions. They not only promote flexibility but also aiding slow learners to repeatedly view difficult content as many times as they want. With the surge in demand for online learning, the need for redesigning and innovate traditional video-based learning is now prominent and become essential for students not just to watch but absorb an active role by involving in the learning process.

Taylors University (TU) has incorporated the video into their Video Management System which has been branded as ReWIND. The development of a video management system equips the video learning to support active learning; various pedagogical strategies with attractive content design have been applied to develop the impactful learning video. Moreover, each video-based learning has been innovatively designed by incorporating the science of learning or how learning takes place.

The Development of Innovative Video-Based Learning

The innovative ideas for video-based learning derived from the Science of Learning and implementation of cognitive science in the teaching and learning field. The learning model has been created based on the cognitive principles that answer all the key questions together with implementing instructional learning theories to achieve those principles.

Following are the key questions that have been applied to build a framework for the innovative ideas to developed Interactive Video-Based Learning.
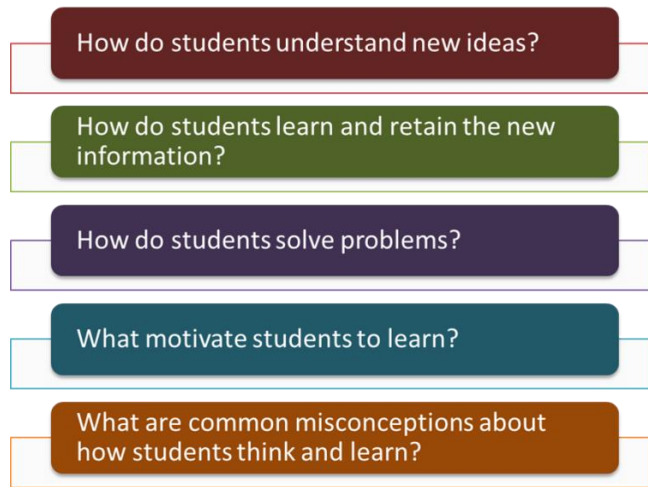
Figure 1.0: Diagram on key questions that reflecting on cognitive principles.
(Deans for Impact, 2015)

The new Learning Model generated by answering the above questions.
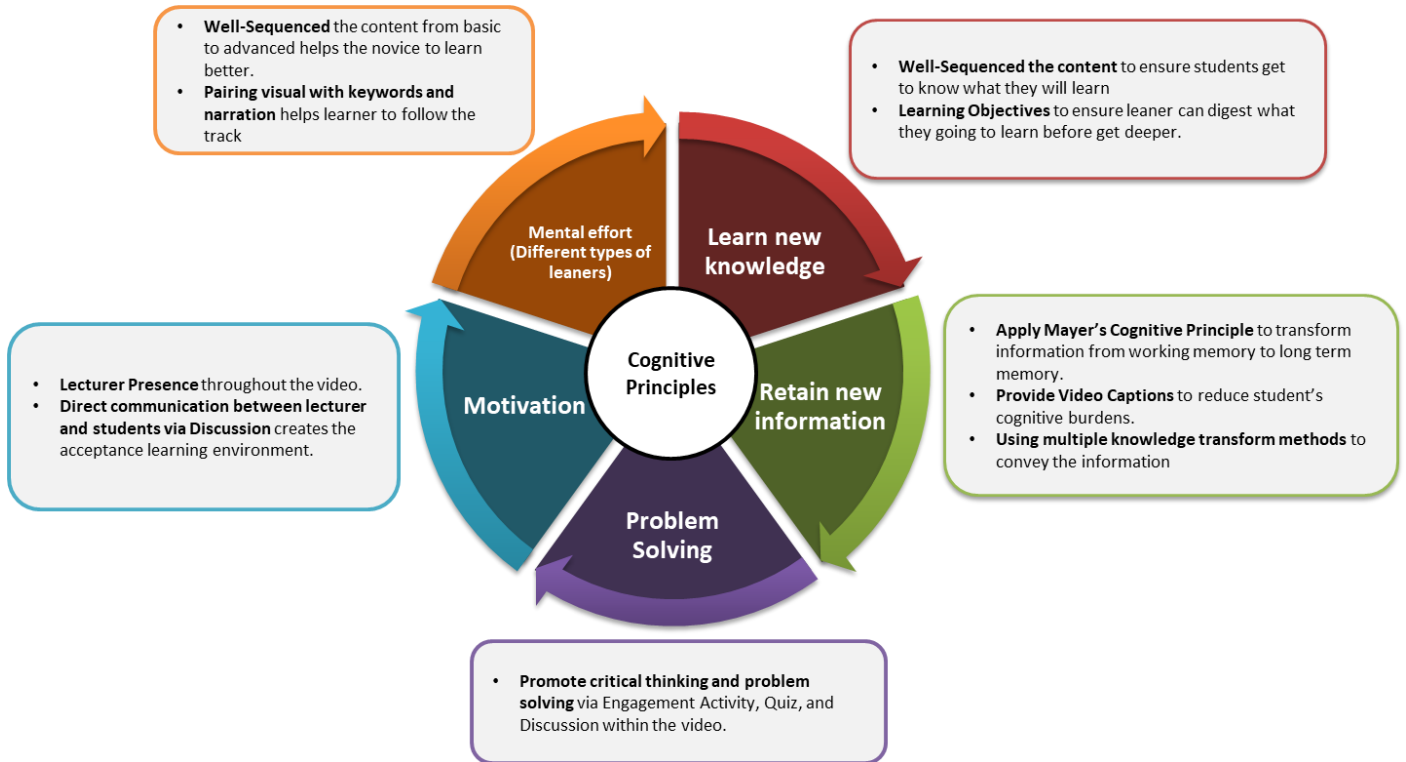
Figure 2.0: Conceptual Learning Model on innovative video-based learning

Followed by the innovative methodology, the creative use of technologies also added value to this product. Creativity is an integral element to make the video we produced relevant to these new breeds of teachers and learners.

Active Peers Discussion within Video-Based Learning

Engagement Activity (Quiz) to trigger the student's attention and participation

ADVANTAGE

The aim of this project is to create a new paradigm in video-based learning. Video Management System Panopto integrated at Taylor's Learning Management (TIMeS) was used as a platform to develop to support active learning via activities. The creative implementation of cognitive principles, learning theories, and a combination of technologies is expected to shift the traditional video-based learning into innovative learning towards the digitalized community.

COMMERCIAL VALUE

The video is the method to deliver educational content through technology in education for higher educational institutions. However, the traditional video-based learning does not meet the current millennial expectation. Therefore, the innovative concept applied to create interactive video-based learning that aligns with 21st-century teaching and learning methods. The video can bring the content 'alive' thus increasing the student's engagement in the learning process.

Moving forward, the innovative strategies on creating an instructional video will bring the education industry a step above for the online learning field and life-long learning.

E-LEARNING MODEL 3.0 IN THE ERA OF INTERNET OF EVERYTHING

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Highlights: "e-learning model 3.0 in the era of Internet of Everything" focuses on the implementation of e-learning in a hybrid learning environment using emerging technology with seven key learning designs. Our case study shows that e-learning model 3.0 has effectively helped students to find their purpose in life, become more self-aware and self-directed in their learning, and develop leadership skills and to apply problem solving, creative and critical thinking skills to design, develop a holistic solutions relevant to the society and real world needs.

Key words: e-learning, Internet of Everything

Introduction

In the coming of Alpha generation and emergence of exponential technology, we need to reshape the education philosophy. Future is Schrodinger Cat and whether human civilization will achieve Kardashev Type 1 civilization in the next 100 years, the key is education, as shared by Nelson Mandela, "Education is the most powerful weapon which you can use to change the world." As Aristotle says, "Educating the mind without educating the heart is no education at all." Hence, we need a paradigm shift of education philosophy from focusing on productivity and skills towards cultivating wisdom, love and being human. We need a collective shift from individualism to collective survival, and the world need to shift from materialism to spiritualism. There is a missing apex in Maslow Theory, i.e. Transcendence.

Content

The Internet of Everything (IoE) (Bandara and Ioraş, 2016) (Cisco, 2013) has four pillars: people, process, data, and things with the aim of advancing the society toward IR 4.0 and the Society 5.0. By integrating PBL with IoE and with emerging technology as a catalyst, higher education system is making a quantum leap from traditional teaching and learning model towards a highly collaborative, interactive and self-directed model for students in universities.

The Purpose Learning Framework (PLF)

e-learning model 3.0 in the era of IoE comprise the following three elements:

- Project-based Learning (PBL)

- Purpose Learning (PL), and
- Taylor's Graduate Capabilities (TGC)

Project-Based Learning (PBL) (Markham, Larmer, & Ravitz, 2003) is an effective means to bridge the knowledge gap between theory and the real-world industry knowledge and skills. By integrating industry competitions in PBL assignments, this hybrid approach is able to optimize the learning outcomes of the students.

In Purpose Learning (PL) (Stanford2025, 2016), students declare missions and pursuit with the purpose that fueled it in order to achieve the missions. By integrating the concept of Purpose Learning into PBL, PBL can be reinvented to embed vision and mission in real industry competition projects with the support from industry experts. Students use the project as a mean to learn new knowledge and skills about the subject and achieve the mission. The idea is that students learn best not during they attend lecture, but when they have their learning objective and work towards the learning objectives.

The Taylor's Graduate Capabilities (TGC) (Taylor's University, 2021) enhance university-level education to meet the ever- changing demands of industry, community and globalisation. TGC outlines the core knowledge, skills, abilities and qualities that students will develop at Taylor's University in order to equip the graduates to be industry-ready.

In this project "e-learning model 3.0 in the era of Internet of Everything", we implemented and redesign PBL assignments by integrating PL and TGS, and have implemented the following seven key e-learning designs by utilizing and integrating the emergence technology and components of IoE:

1. Purpose Learning is achieved via mentorship, continuous virtual coaching, sharing of success stories, case
   studies of successful projects, and inspirational talks and videos.
2. TGCs are developed via PBL embedded with various industry events, i.e. guest lectures, expert forums, webinars, workshops, e-learning forums, industry competitions, etc.
3. Knowledge and resources are shared via various e-learning activities designed on TIMeS (Taylor's Integrated
   Moodle e-Learning System), e.g. online quizzes, e-forums, videos, news, recorded lectures and tutorials, etc.
4. Motivation and interaction is strengthened via online games and real-time gamification assessment, e.g. digital badges, Hour of Code activities, Kahoot, etc.
5. Synchronous and asynchronous interactive e-learning and m-learning activities (polls, video, quiz, drawing,
   online reading and research, feedback, and notes) are implemented via Nearpod with automated reporting.
6. Social learning and real time communication between learners and facilitators are implemented via social
   media such as Facebook (group, page and messenger), WhatsApp, Skype, Zoom, Microsoft TEAMS and emails.
7. Lifelong learning is achieved via MOOC and industry certifications, e.g. Udacity nanodegrees, MITx, edX, Coursera, Khan Academy, TEDx, etc.

Impact

At the School of Computer Science and Engineering (SCE), Faculty of Innovation and Technology (FIT), Taylor's University, we examined student learning experiences and learning outcomes through real industry competition in a case study that embedded into modules assignments. Some key achievements from 2017 to 2021 are as below:

1. 2021, a team won First Runner-Up in Hilti Global IT Competition 2021 with innovative ideas, design and solutions for remote work and collaboration in the construction industry.
2. 2021, a team won Top 10 Finalists in Hilti Global IT Competition 2021 with innovative ideas, design and solutions for remote work and collaboration in the construction industry
3. 2021, a team won 3rd place for the Alibaba Cloud Developer Initiative 2021 competition.
4. 2021, a team won top 10 finalists in the MCM Unipreneurship Development Grant 2021.
5. 2020, two girls' team won Champion in Code4Life Inter-University IT Virtual Hackathon 2020 by Roche.
6. 2020, the Movement team comprised of 3 students from SCE won 1st Runner-up in Alibaba Global Challenge.
7. 2020, the team Fitee won 4th Runner-up in Alibaba Global Challenge 2020.
8. 2019, three degree students won 3rd runner up at Huawei ICT Competition Malaysia 2019.
9. 2019, five students from Foundation In Computing won 1st runner up in International Hilti IT Competition 2019.
10. 2018, four degree students won 1st runner up in IDEATHON category at NASA Space Apps Challenge Kuala Lumpur 2018.
11. 2018, four degree students won 1st runner up at NEM Merdeka Hackathon 2018.
12. 2017, five degree students won Champions in NASA Space Apps Challenge 2017 (Ideathon – 10 Categories).
13. 2017, four students from Foundation in Computing won Champions in NASA Space Apps Challenge 2017 (Ideathon – Social Networking Services).

Conclusion

In a nutshell, with the emergence of IoE, educators at universities are facing further challenges on how to integrate emerging technology into the area of learning, teaching, and facilitating with the aim to optimize learning outcomes. In this project, results have shown that this e-learning model 3.0 can enable students to learn effectively and ultimately find their purpose in learning and life, as said by Allan Bloom, "Education is the movement from darkness to light".

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APPLICATION OF LEARNING ANALYTICS IN BIOTECHNOLOGY VIRTUAL WORKSHOP SERIES: DEVELOPMENT AND VALIDATION OF A PREDICTION MODEL FOR TARGETED OUTREACH AND ENGAGEMENT

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Highlights: Although Biotechnology has been regarded as the driver of the nation's economy, awareness in this field among the public remains low. Dissemination of effective and engaging content to key stakeholders would be essential to drive interest in Biotechnology. This study aimed to develop and validate a prediction model to evaluate targeted outreach and engagement of a series of Biotechnology virtual workshops in COVID-19 pandemic research using learning analytics. The analysis can be used to target wider dissemination on the renewed focus of Biotechnology in research and education, thereby increasing the STEM population in Malaysia.

Key words: Biotechnology; COVID-19; Virtual workshops; Analytics; Predictive model;

The country has seen significant progress since the inception of biotechnology policies and initiatives (Arujanana and Singaramb, 2018). Nevertheless, the awareness for Biotechnology among the public and stakeholders is still low. Recently, there is an increasing shift of the efforts in promoting science and Biotechnology education through virtual workshop series to disseminate essential information and engage key stakeholders' interest in the field. Nevertheless, it is difficult to measure participants' engagement in the web-based learning systems. A predictive model can help guide the understanding on topics that are able to drive interest and create more engagement. This innovation described the development of prediction model which encompasses 3 stages (Data Collection, Model Creation and Validation) (Figure 1) for evaluation on the Biotechnology Virtual Workshop Series organized by academics from Taylor's University School of Biosciences. The Virtual Workshop Series featured video recordings ranging from the detection of SARS-CoV-2 with CRISPR diagnostics, development of nanoparticles as potential antiviral agents, to plant-based vaccines and industrial manufacturing processes.
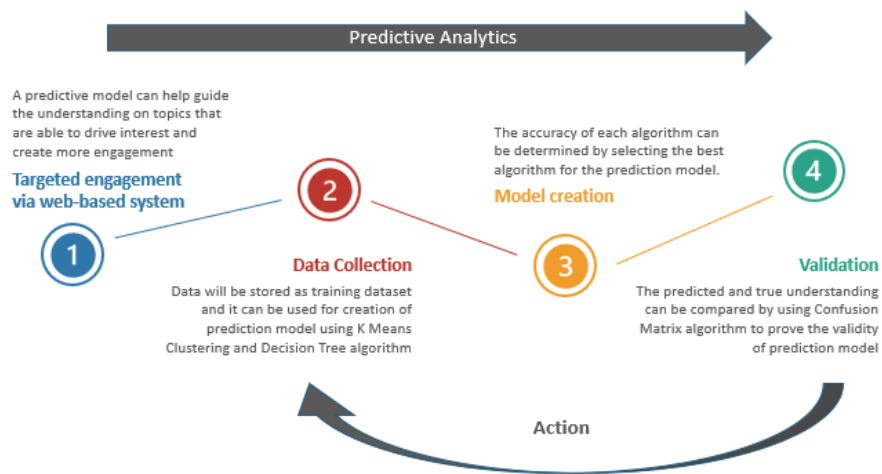
Figure 1: Predictive modeling for targeted workshop engagement in Science and Biotechnology education

The study engaged separate groups of high school students who have or have not participated in the virtual Biotechnology workshop series and their understanding level on different Biotechnology topics was collected. Data was stored as training dataset and it was used for creation of prediction model using K Means Clustering and Decision Tree algorithms (Shaymaa et al., 2015). The accuracy of each algorithm was determined to choose the best algorithm for the prediction model. Then, the prediction model was validated by predicting the understanding and interest of another group of high school students who were or were not engaged in the workshop series. Data was collected and used as test dataset. This test dataset was used to predict the understanding and interest level by using the existing prediction model. The predicted and true understanding were then compared by using Confusion Matrix algorithm to prove the validity of prediction model (Thaddeus et al., 2015).

Our data showed that the predictive model can be used to inform significant level of targeted engagement in the workshop series. In addition, it was shown that the workshop topics associated with disease diagnosis and treatment have gained the most significant interest in terms of audience retention and watch time. The findings from this study could potentially be used to model the level of knowledge and interest in specific topics, which serve to drive wider publicity on its role in advancing Biotechnology education and awareness. Although this project only focused on Biotechnology, this model can be replicated and transferable to other disciplines.

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PROGRAMING LEARNING VIA GAMING EDUCATION: ROBLOX GAME FOR ELEMENTARY SCHOOL STUDENTS

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Highlights: It is difficult for students to understand the concept of programming, and other requirements to produce a program such as programming environment, language syntax knowledge, problem understanding debugging, variables, algorithms and mathematical language. Kids love video games that involve friends. ROBLOK-games are a free online game platform where kids can create games and play with friends. This develop module is suitable for primary school students to understand the basic concepts of producing programming when they need to choose several icons and steps to create an online game.

Key words: *Programming, game-learning, elementary school student, Malaysia, E-learning.*

Introduction

Educators are increasingly realizing that teaching coding to children will not only help them understand how information technology works, but will also provide them with an ability for potential opportunities and careers. Different thinking skills and fields of knowledge are needed for programming processes. There is a research void in the effort to discover the direct or indirect efficacy of learning–teaching processes in elementary programming education.

Content

Roblox is a global platform that brings people together through play. Roblox is an online game platform and game creation system developed by Roblox Corporation. It allows users to program games and play games created by other users. The COVID-19 pandemic has affected Roblox in numerous ways. Due to quarantines imposed by the pandemic limiting social interaction, Roblox is being used as a way for children to communicate with each other.

One of the most noted ways that this method of communication is being carried out is the phenomenon of birthday parties being held on the platform. COVID-19 has caused a substantial increase in both the platform's revenue and the number of players on it, in line with similar effects experienced by the majority of the gaming industry, as players forced to remain indoors due to COVID-19 lockdowns spent more time playing video games.

Description of process

The aim of using games in this context is to teach students something serious and complicated, such as programming, while having fun creating and playing games. Apply Roblox game will give student understanding on variables, algorithm, programming language and software.

Context or background of the process
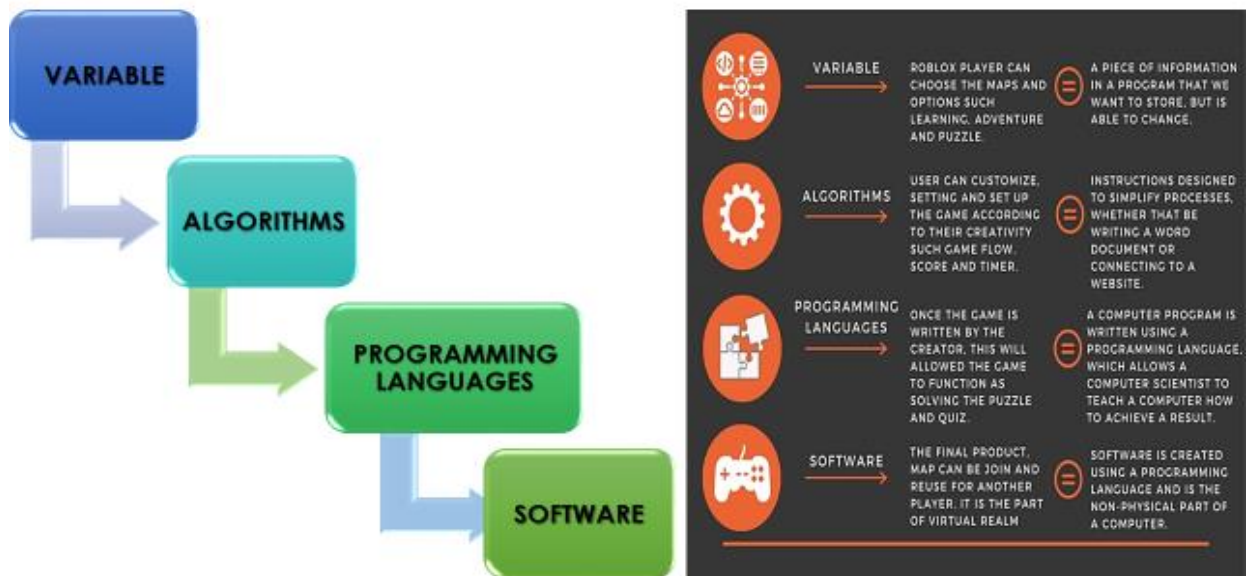
Figure 1: Creating map game in Roblox, Grand Theft Auto V online and Hobbo Hotel.

Figure 1 show example of game create in Roblox that can be used to instruct students on programming learning. It a comparison 1: 1 between in game module setup and life learning based. In this chapter, student will be expose to several basic term in programming that are variable, algorithms, programming languages and software.

Variable: A piece of information in a program that we want to store and can be change by time. Algorithms: Instructions designed to simply process whether that be writing a word document or connecting to a website.
Programming Language: A computer program is written using a programming language which allows a computer scientist to teach a computer how to achieve a result.
Software: Software is created using a programming language and non-physical part of a computer.

Important to education

Building an interactive and up -to -date learning syllabus appropriate to the age group is important to ensure that students can understand why a subject is run and not just get output. The information learned must be knowledge that is in line with the talents of students to cultivate interest in a field. Game based programming with storytelling increased motivation for programming for students in school.

Advantages of process towards education and community

Apply Roblox game has impacted tons of students positively. A large number of students want take part in game-based programmes and activities. We can encourage student's community activities such as science fairs, student project exhibitions and open workshops. Students can participate in student competitions and events. We want to redefine and reimagine education by

changing the child's mind not to see learning as a hurdle, but a vehicle that one takes to fulfil their dreams. When students produce a simple game, they have actually built a software which causes them to unknowingly know some steps to build software. So it is easier for the instructors to explain the terms used based on the practice they have done.

The relentless outbreak of Covid 19 in Malaysia has raised concerns among parents about their children's education. The use of Roblox games in the world is also increasing when people are forced to confine themselves at home. This situation can be used by parents to teach their children about coding and creating software. Furthermore, Roblox is a free online game, we are sure every parent can afford to use to their child as a teaching material.

Commercial value in terms of marketability or profitability of process

The relentless outbreak of Covid-19 in Malaysia has raised concerns among parents about their children's education. The use of Roblox games in the world is also increasing when people are forced to confine themselves at home. This module can be used by parents to teach their children about coding and creating software. Furthermore, Roblox is a free online game, we are sure every parents can afford to use to their child as a teaching material.

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LOST BOY CALCULIC ADVENTURE (LBCA): A GAME BASED LEARNING APP FOR YEAR 1 DYSCALCULIC CHILDREN

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Highlights: Lost Boy Calculic Adventure (LBCA) is an educational mobile game that was developed to help the Year 1 dyscalculic children to learn Mathematical skills in a fun and engaging way. It was developed based on the topics covered by the Year 1 Mathematics syllabus. Its purpose is to help the Year 1 dyscalculic children to identify basic math numbers and symbols, to improve their Mathematical arithmetic skills especially in addition and subtraction, and to expose them with counting money and reading time.

Key words: Dyscalculia, Mathematics, Year 1, arithmetic skills, mobile game, LBCA

Introduction

Dyscalculia is a disorder that causes difficulties in learning mathematical concepts, performing arithmetic operations, memorizing mathematical terms, and understanding how mathematical formulas and arguments are formulated (Jerin, Zaki, Mahmood, Rochee & Islam, 2020). Common effects of dyscalculia include difficulty with number sense, fact and calculation, and mathematical reasoning (Doyle, 2010). This may present as difficulty linking numbers and symbols to amounts and directions, making sense of money, or telling time on an analogue clock. Researches claims that Mobile applications support children with dyscalculia to complete a bigger number of activities and enhance their mind mapping capacities (Skiada, Soroniati, Gardeli, & Zissis, 2014). It has been discovered that Dyscalculic children learn better through instructive amusements and fun learning tools (Juliet & Nagavalli, 2015) and mobile games could be used as an informal teaching method for the dyscalculic children (Ariffin, Halim, Arshad, Mehat, & Hashim, 2019).

Lost Boy Calculic Adventure (LBCA) is an educational mobile game that was developed to improve Mathematics skills of Year 1 dyscalculic students. LBCA was developed based on the Year 1 Mathematics syllabus and is expected to help reinforce skills and topics as well as to motivate students to do more Mathematical skills at anytime and anywhere. The purpose of this mobile game-based learning application is to help dyscalculic children to identify basic math numbers and symbols, to improve their Mathematical arithmetic skills especially in addition and subtraction, and to expose them with counting money and reading time. LBCA was developed with multimedia elements such as animation, sound and narration, text, video, and graphic.

Content

LBCA was designed and developed using ADDIE (Analysis, Design, Develop, Implement and Evaluate) Model. It's developed using UNITY software and is very consistent

in term of all the game elements such as buttons, labels, wording and the interface format. It has 16 levels which 16 different themes. Each level represented each chapter that based on the Year 1 Special Education Mathematics syllabus. In order to install this mobile game, it required Android version 6.0 and above. This mobile game was developed in English language and it can be used without internet connection. LBCA is an effective pedagogical tool for dyscalculic children to learn Mathematic. It does not only emphasize on the assessment but also has tutorial videos to guide the children in learning process. Not only that, feedbacks can be seen in many places such as starting instruction, correct and incorrect feedback, level completion and rewards.

By adopting LBCA on teaching Mathematics lesson to the dyscalculic children, it brings the benefit to students and leads them to have a positive attitude towards Mathematics. It helps the Year 1 dyscalculic children to identify basic math numbers and symbols, to improve their Mathematical arithmetic skills especially in addition and subtraction, and to expose them with counting money and reading time. It also increases the students' motivation and active participation. It can assist the teachers and parents on the teaching and learning process of the dyscalculic children. Therefore, LBCA give a new and desirable kind of experience for the special need student in learning Mathematics and provide an opportunity to improve on the traditional classroom teaching using game-based learning.

The following figures are the interfaces of Lost Boy Calculic Adventure mobile game.

Figure 1. Main Menu

Figure 2. Levels
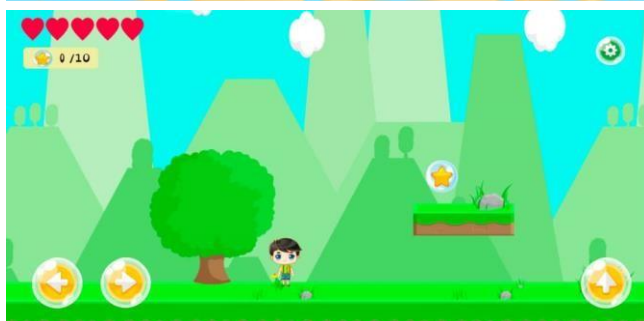
Figure 3. Game Interface
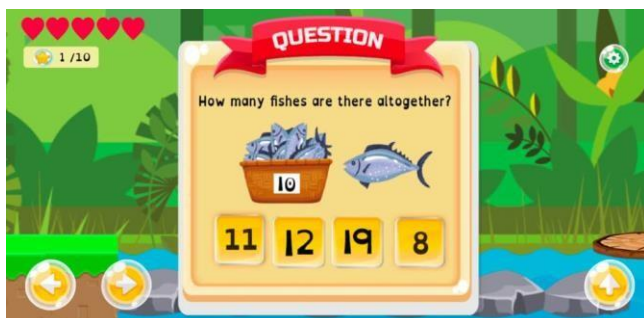
Figure 4. Question Interface

Figure 5. Feedback Interface

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DEVELOPING GRAPHS AND CHARTS INSTRUCTIONAL VIDEO IN TEACHING AND LEARNING DUE50032: COMMUNICATIVE ENGLISH 3 AT UNGKU OMAR POLYTECHNIC, 2021

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Highlights: The accelerated use of video in higher educational settings has resulted in video-sharing sites to be filled with both amateur and professional videos covering a wide selection of topics. The existence of abundant videos however, serves as a challenge for polytechnic lecturers to identify video resources and instructional strategies that can be effectively used in covering all of the intended lesson outcomes of a subject. On this basis, the innovation is designed in a form of a video that captures lecture content specifically for topic on Graphs and Charts in DUE50032: Communicative English 3 by developing the appropriate instructional strategy and pairing it with comprehensive media format to boost students' engagement and give directions in completing their tasks.

Key words: video resources, instructional strategies, effective media format

Introduction

Since years ago, video-based learning has been used as an educational tool in assisting classroom teaching. Likewise, the current pandemic faced by the whole world has forced both students and lecturers to accommodate teaching and learning online. This has most notably created a rapid growth in changing the learning environment and increasing video use in education. Researchers have also noted a burst in online courses and a swiftly changing understanding of how video can be used effectively to enhance learning (Schneps et al. 2010).

After one full semester of teaching online, polytechnic lecturers have had some reflections on the vital and key questions that explore numerous undertakings to improve and develop materials that could better help students to understand their lessons. This leads to video being one of the most impactful media tools to create a tangible difference in the polytechnic education. An effective and comprehensive video could possibly have a great impact on students' engagement with the course itself and indirectly assist their learning process. However, most crucially, it is aimed to help students at all levels to grasp the lesson at their own pace.

Description of the Innovation

The video depicts the important elements of graph and chart and methods to create a good graph and chart by including all of the essential elements. Students are initially briefed on the types of graph and chart, the appropriate types to be used in representing certain data and followed by the important elements that should be included to make them complete. The video focuses on three types of graph and chart which are pie chart, bar graph and line graph. It further discusses five important elements a graph should have, which are Title, Label for axes (X and Y), Legend

and Data as well as three important elements a chart should have, which are Title, Legend and the Percentage. The video then demonstrates the step by step progress on creating a graph and a chart that include all of the important elements discussed in an easy, comprehensive and interactive way. The duration of the full video is 10 minutes, but it can be divided into three sections which lasted around three to four minutes each. Below is the chronological arrangement of the video content:

Figure 1: Video Timeline
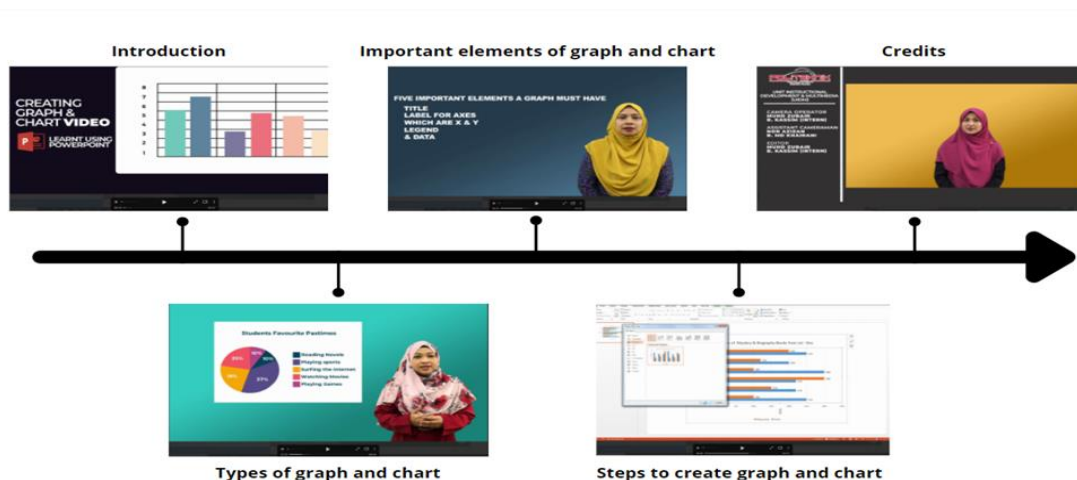
Background of the Innovation

In DUE50032: Communicative English 3 course, students are required to prepare raw data from various sources of information and display the prepared data in suitable graphic forms. This task is usually done in a face to face classroom setting, where the students are guided step by step by the lecturers in creating the graphs and charts by including all of the important elements. Instant feedbacks are then given by the lecturers by looking at the students' work. Going online due to the pandemic, the lesson is taught by showing the steps in PowerPoint slides to the students. It is remarkably apparent in their presentation that this is not an effective way of teaching this particular unit after noting that their graphs or charts are not appropriately chosen and missing some of the important elements.

It is the lecturer's task 'to create a coherent narrative path through the mediated instruction and activity set such that students are aware of the explicit and implicit learning goals and activities in which they participate' (Anderson et al., 2001). Students should be given the opportunity to learn better via multiple sources, and in regards to the current situation, the online class where they could listen to the lecturer's oral explanations, can now be paired by viewing the developed visual media. The usual manual of step by step ways on how to create a graph or chart is now aided with a video that shows them how to do it visually, where they can also pause and digest at their own pace.

Advantages of the Innovation

The use of video allows more efficient processing and memory recall. This fulfils the aim of this innovation, which is to produce supportive material in relation to students' learning task to ensure that they are able to fulfil all of the criteria needed in their presentation. There is no commercial value in terms of marketability or profitability of this innovation, however, it could be used by all 36 Malaysia Polytechnics offering the subject.

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E-SULAM INNOVATIVE: MUALIM2021

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E-SULAM INNOVATIVE: MUALIM2021 mengaplikasikan Pedagogi Service-Learning yang mana pelajar bertindak sebagai pemberi perkhidmatan yang menggunakan ilmu dan kemahiran yang dipelajari di dalam kursus akademik untuk memberi perkhidmatan berdasarkan kehendak komuniti iaitu Guru-Guru KAFA negeri Kedah yang diadakan secara dalam talian. **MUALIM2021** melibatkan kursus SGDI5053 dan VKMB2041. Projek ini dianjurkan UUM dengan kerjasama UHAMKA, Universiti Malaysia Perlis, Kolej Komuniti Langkawi, Jabatan Agama Islam Negeri Kedah, PERKIM Langkawi, AKSARA Perlis dan JINGGA13. Antara pengisian dalam program ialah sesi perkongsian ilmu melalui 10 slot ucaptama dan turut mendapat publisiti dan liputan media di UUM, UNIMAP, Radio Kedah dan akhbar Utusan.

Kata Kunci:*E-SULAM INNOVATIVE, Pendidikan Islam, Service Learning, Komuniti, Kreativiti, Inovasi*

Pengenalan:

Service-Learning menggunakan pembelajaran yang berpusatkan pelajar, dibentuk melalui pengalaman pelajar menjalani aktiviti di lapangan. Pembelajaran melalui pengalaman ini bertujuan melibatkan individu secara aktif (Andrew Furco & Shelley H.Billig 2002) dan merujuk kepada pengalaman pendidikan yang disusun secara berstruktur (Pamela Steinke & Peggy Fitchy 2007; Seifer SD & Connors K. 2007). Manifestasi falsafah pendidikan menyenaraikan Service-Learning sebagai satu kaedah juga amalan pengajaran dan pembelajaran (Kamisah Osman 2011) yang berimpak tinggi (HIEP–High Impact Educational Practice) di universiti-universiti terkemuka dunia (Najah Nadiah Amran & Hamdi bin Ishak 2017). Ini kerana kaedah ini menyediakan peluang yang berharga kepada pelajar untuk melalui pembelajaran berdasarkan pengalaman di dunia nyata. HIEPs adalah amalan pendidikan berimpak tinggi yang berupaya meningkatkan penglibatan pelajar dari segi tingkah laku, emosi dan kognitif, bersifat integratif dan connected. Namun dalam era pandemik Covid-19, pembelajaran Service Learning dijalankan secara dalam talian dengan diperkenalkan E-SULAM INNOVATIVE yang mengaplikasikan Pedagogi Service-Learning, yang mana pelajar bertindak sebagai pemberi perkhidmatan yang menggunakan ilmu dan kemahiran yang dipelajari di dalam kursus akademik untuk memberi perkhidmatan kepada komuniti yang telah dikenalpasti. Perkhidmatan yang diberikan perlu melibatkan penggunaan teknologi ICT sebagai medium penyampaian perkhidmatan kepada komuniti.

E-SULAM INNOVATIVE: MUALIM2021 (*Membangun Ummah Aktif Lestari Inovasi Pendidikan Islam Masa Kini)* dirangka berdasarkan kehendak komuniti iaitu Guru Kelas Al-Quran dan Fardhu Ain (KAFA) negeri Kedah yang diadakan secara dalam talian selama 5 siri pertemuan bermula 5 Mac 2021 hingga 2 April 2021. Seramai 60 orang guru-guru KAFA Negeri Kedah dalam projek ini. MUALIM2021 melibatkan kursus SGDI5053 dan VKMB2041. Pelajar SGDI5053 berperanan sebagai jurulatih Bengkel Inovasi Pendidikan Islam berasaskan

pembelajaran teknologi: *mentimeter, Google meet, voice thread, kahoot, telegram*, *youtube, Socrative, google form, facebook* dan *quizizz*. Manakala pelajar VKMB2041 pula bertindak sebagai pelaksana program dalam mengendalikan acara majlis, moderator dan pengurus promosi serta secretariat. Projek ini telah mendapat kelulusan Dekan Pusat Pengajian Pendidikan dan Pengarah Pusat Pendidikan Profesional dan Lanjutan (PACE) serta kerjasama dengan UHAMKA, Universiti Malaysia Perlis, Kolej Komuniti Langkawi, Jabatan Agama Islam Negeri Kedah, PERKIM Langkawi, AKSARA Perlis dan JINGGA13. Antara pengisian dalam program ini juga ialah sesi perkongsian ilmu melalui 10 slot ucaptama yang disampaikan oleh pakar bidang terdiri daripada pensyarah UUM, UNIMAP, UHAMKA Indonesia, AKSARA Perlis dan JINGGA13. Projek E-SULAM INNOVATIVE MUALIM2021 turut mendapat publisiti dan liputan media di UUM, UNIMAP, Radio Kedah dan akhbar Utusan Malaysia pada Jumaat, 12 Mac 2021. Projek ini amat penting kepada komuniti Guru-Guru KAFA dalam meningkatkan kemahiran pengajaran berasaskan teknologi di era norma baharu dalam Pendidikan Islam.

Terdapat beberapa isu yang boleh ditangani melalui projek ini. Antara isu-isu tersebut adalah seperti berikut:
1. Mengatasi masalah kurang kesediaan dalam kalangan guru KAFA untuk mendepani proses pengajaran dan pembelajaran secara atas talian.
2. Mereka memerlukan sesuatu yang menarik dan terkini untuk memastikan pelajar mengikuti proses pengajaran dan pembelajaran serta objektif pembeajaran dapat dicapai.
3. Pelajar memerlukan sesuatu yang interaktif berbanding kaedah tradisional yang biasa digunakan oleh guru didalam kelas.
4. Untuk menjadi guru yang kreatif dan inovatif memerlukan sumber inspirasi atau pencetus seperti yang akan dilaksanakan dalam projek ini.

Objektif E-SULAM INNOVATIVE: MUALIM2021 adalah:

1. Menghasilkan Modul Pembelajaran Digital menggunakan Web 2.0 bagi mewujudkan pembelajaran interaktif

2. Meningkatkan ilmu dan kemahiran pelajar dalam melaksanakan program Bersama komuniti.

3. Melaksanakan aktiviti perkongsian ilmu kepada Guru Kelas Al-Quran dan Fardhu Ain (KAFA) Daerah Langkawi berkaitan 10 Aktiviti Online Learning yang boleh digunakan semasa PDPR.

Memandangkan Wabak Covid 19 belum pulih, projek ini akan di adakan secara atas talian iaitu dengan menggunakan Aplikasi *Webex* untuk sepanjang proses perkongsian ilmu bagi setiap ucaptama dan bengkel kepada komuniti guru KAFA. Pendekatan e-SULAM ini akan membuka minda peserta dalam memahami dengan lebih jelas berkaitan pembelajaran atas talian, cabaran dan persediaan melalui slot ucaptama yang telah di jadualkan. Selain itu, antara tujuan utama e-SULAM juga merupakan usaha kementerian pengajian tinggi untuk memastikan pelajar-pelajar Institut Pendidikan Tinggi turut terlibat dalam memberikan khidmat dalam bidang yang diceburi kepada komuniti yang memerlukan. Khidmat pelajar dalam projek ini ialah mengadakan bengkel aktiviti web 2.0 kepada komuniti guru KAFA negeri Kedah yang akan mendatangkan manfaat kepada mereka untuk menggunakan krativiti dan inovasi dalam menghasilkan modul pembelajaran yang interaktif. Bengkel berkaitan aktiviti pembelajaran secara atas talian yang diberikan juga dapat digunakan oleh guru KAFA untuk menyahut seruan kerajaan yang telah menganjurkan pengajaran dan pembelajaran di rumah (PDPR) sepanjang penularan wabak Covid 19 ini sekaligus dapat membantu guru-guru KAFA yang menghadapi cabaran atau kurang kemahiran dalam menggunakan aplikasi bagi pembelajaran atas talian. Manfaat projek ini bukan

sahaja daripada 60 orang peserta yang dipilih, malah mereka merupakan wakil dari pusat-pusat KAFA yang akan meneruskan perkongsian kemahiran yang diperolehi kepada guru-guru dari pusat KAFA masing-masing. Untuk maklumat lengkap berkaitan E-SULAM INNOVATIVE: MUALIM2021 bolehlah dirujuk dalam ruangan padlet berikut: https://padlet.com/fadhilkklk/az5q4isnn06t7wyg

Penutup

Pembelajaran berasaskan perkhidmatan dalam Program khidmat masyarakat yang mengabungkan pelajar Sarjana dari Pusat Pendidikan Islam UUM (PPS) dan pelajar Sarjana Muda dari Pusat Pendididkan Profesional dan Lanjutan (PACE) UUM. Program khidmat masyarakat yang dimaksudkan adalah satu program yang membangunkan produk inovasi berkaitan pengajaran dan pembelajaran abad 21. Program ini diadakan secara online yang menggunakan aktiviti web 2.0 yang boleh digunakan di dalam pengajaran dan pembelajaran abad 21 di mana penggunaan aktiviti web 2.0 ini akan menjadi medium utama di dalam proses Pendidikan di abad 21. Untuk menjayakan program ini, maka dengan kerjasama pensyarah merangkap penasihat program ini iaitu PM Dr Mardzelah binti Makhsin, telah membentuk satu pasukan jawatankuasa kerja program yang terdiri daripada Pengarah Projek, Ketua Projek seterusnya kepada AJK projek yang memainkan tugas dan peranan yang tersendiri disamping menjalankan kerjasama dengan berbagai agensi, NGO, pihak industri di dalam mahu pun di luar negara seperti Persatuan Karyawan Indera (AKSARA) negeri Perlis, Jingga13 Malaysia, Universiti Malaysia Perlis (UniMAP), PERKIM, Pejabat Agama daerah Langkawi, Kolej Komuniti Langkawi, Pertubuhan Amal dan Kebajikan Perlis, Universitas Muhammadiyah Prof. Dr. Hamka (UHAMKA) Indonesia dan lain- lain lagi serta penglibatan secara langsung pihak UUM sendiri. Program khidmat masyarakat ini adalah bertujuan untuk memberi latihan kepada guru KAFA negeri Kedah terutamanya di daerah Langkawi berkaitan penggunaan web 2.0 di dalam aktiviti pembelajaran dan pengajaran. Selaras dengan penganjuran program ini juga, pihak kami memasuki pertandingan e-SULAM INNOVATIVE 2021 anjuran pihak Kementerian Pengajian Tinggi (KPT). Program ini dijalankan selama 5 minggu yang diadakan pada setiap minggu iaitu pada hari Jumaat bermula daripada 5 Mac 2021 sehingga 2 April 2021 bermula pada pukul 3 petang dan berakhir pada pukul 7 petang hari yang sama. Tajuk yang dipilih untuk program ini adalah MUALIM2021 "Membangun Ummah Aktif Lestari Pendidikan Islam Masa Kini".

Penghargaan

E-SULAM INNOVATIVE: MUALIM2021 mengucapkan terima kasih dan setinggi-tinggi penghargaan kepada Pusat Pengajian Pendidikan (SOE), Pusat Pendidikan Profesional dan Lanjutan (PACE), UHAMKA Indonesia, Universiti Malaysia Perlis, Kolej Komuniti Langkawi, Jabatan Agama Islam Negeri Kedah, PERKIM Langkawi, AKSARA Perlis dan JINGGA13.

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GAMIFIED ONLINE PROFESSIONAL DEVELOPMENT (GOPD) PROGRAM FOR LECTURERS

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Highlights: Previous studies have shown that gamification in learning may foster engagement and motivation. While prior gamification studies are heavily centred on the students' population, this study offers a unique contribution from lecturers' perspectives. This study investigated the effective strategy to gamify professional learning for adults, specifically for lecturers. Drawing on the major motivational theories in the gamification field, the researchers designed and developed a prototype to assist lecturers in completing professional development. This study incorporated a systematic gamification design framework in the design and development of professional learning to make it fun and meaningful. This study found that lecturers perceived that the gamification approach was enjoyable and motivated them in completing professional learning.

Key words: gamification, professional learning, professional development, online professional

Introduction

Professional development plays a critical role to ensure lecturers remain competent in their field. Due to the practicality of online professional development (OPD) that could be accessed anytime and anywhere, it has been implemented widely, especially during the pandemic COVID-19. Nevertheless, sustaining engagement in OPD is very challenging, and a high level of dropout in OPD was reported (Luz et al., 2018). The ongoing discussion in the literature has prompted us to a question: How to design an effective OPD for lecturers?

Previous studies indicate that gamification could be a remedy for maintaining motivation. Gamification defined as "*the use of game design elements in non-game contexts*" (Deterding et al., 2011, p. 10). The latest systematic literature review performed by Hernández and Moreno (2019) showed positive results on the usage of gamification in professional learning. Without changing the purpose, gamification can serve as an effective approach in enhancing the existing professional development.

Drawing upon major theories in the gamification field, we employed a gamification strategy to design and develop a prototype named SPECTRUMx. SPECTRUMx is an online gamified professional learning programme available on the Moodle-based learning management system at a Malaysian public university. It provides hands-on practices and step-by-step guides on how to design online learning modules. Lecturers can access the gamified programme at their own pace and convenience. The gamified programme was developed based on a systematic gamification design framework and integrated the three most crucial gamification categories (achievement, immersion and social gamification features) to motivate lecturers in self-paced professional learning

The gamification elements used are not only limited to badges, points and leaderboard, but also utilised various gamification elements for an immersive experience such as narrative video,

personalised task, and virtual profile. Figure 4 shows some of the gamification elements available in the gamified programme. Once lecturers have completed the module, a digital certificate will be instantly available to be downloaded as a completion reward.

The findings of this research revealed that gamification is enjoyable for lecturers in completing their professional development. Moreover, the gamification strategy has also positively encouraging lecturers to complete their professional learning. The findings of this study could shape the future direction of the organisation that are struggling to motivate their staffs, especially during the pandemic COVID-19. As gamification was found effective in motivating adult learners, the organisations may consider deploying the gamification approach as their strategic plan to boost the motivation of their staff in the workplace. In addition, the systematic gamification design framework used in the present study could benefit other institutions that are interested in implementing gamification in professional development.
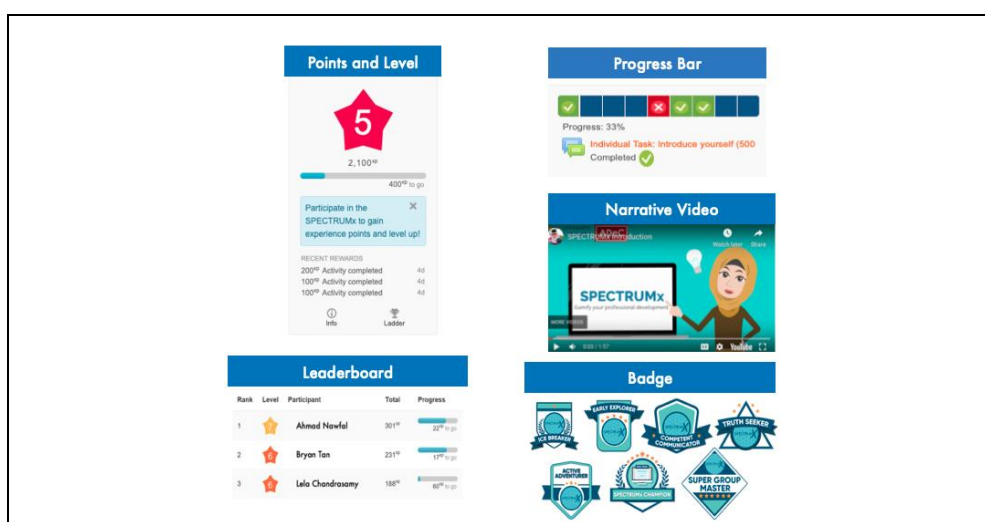
Figure 4. Sample of gamification elements.

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STRANGER DANGER AWARENESS

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Highlights: This project aims to create awareness towards kidnapping among young children between 7 to 10 years old. The project members designed and developed fun learning, dual-language teaching materials to educate young children on Stranger Danger's awareness. Therefore, an e-comic consisting of the real-life scenario for the home alone and online stranger theme was created. Quizzes and a video were embedded on the e-comic to make the reading more interactive and engaging. A video montage consists of tips for stranger danger awareness was created as a pre-workshop task. Interactive online workshop via Zoom, online activities and competition activities were also conducted to help educate young children between the ages of 7 and 10 on the danger they might face with strangers. All the learning material was uploaded in Padlet, made available to online. Children can read the e-comic and complete the activities embedded within the e-comic, teachers can use the teaching material during a free period in class, and parents can also use this teaching material with their young children at home to increase the awareness of stranger danger.

Key words: *stranger, danger, e-comic, awareness.*

Introduction

Tragic and frightening kidnappings are often reported in our national news. The 2017 statistics shows that an average of four children goes missing in Malaysia every day. In the year 2017, between January to June, there were 723 missing children's cases in 181 days of the total, 345 have been found, while others are still missing (Indicator, n.d.).

To make it worse, today parents are battling with an online predator as majority of the children now have access to the internet. Children spend more time online rather than in real-time. A recent study of nearly 4,000 children found that on social media and gaming sites, 43 percent of those aged between 8 and 13 years speak to people they have never met in real life on social media and gaming sites (Ansari, n.d.). Parents are always concerned with the questions: "Is the Internet safe for my children? How do I protect them?" Another question that always arises among parents.

Among other factors contributed to this situation is the lack of awareness among the children themselves on how kidnapping can happen naturally when they are less careful and easily share their personal data to online strangers via social media and online games.

Concerned with this situation, this project aims to educate young children age 7 to 10 years old about protecting themselves from bad strangers. There are 2 components involved in this project:

- Design and development of an e-comic to educate young children about bad strangers; and

- Delivery and implementation of the project via online Zoom workshop to a group of 40 young children age 7 to 10 years old.

Each of this component is explained in the next sections.

Description of innovation, product design and development processes

This project is inspired by the Civic-Minded Instructional Design (CMID) framework (Yusop & Correia, 2012). The CMID concept believes that a competent civic instructional designer works at three contexts: micro, macro, and mega. This project operated at the children's micro context which is the children's immediate environments, such as at home, neighborhood, school and play areas.

As previously mentioned, there are 2 components of this project. All of the materials of this project is accessible online at the group's Padlet https://bit.ly/3fnRbN9.

1. Design and development of an e-comic to educate young children about bad strangers

To attract children's attention to read such a heavy material on the stranger danger topic, an e-comic was created featuring Eli, a cute elephant, and his buddy Ricky, a 7-year-old boy. Children's learning gradually develops as Eli converses with Ricky in various scenarios. Each of the scenario represents the bit-size learning materials for the children. In this e-comic, Eli functions as an education agent to prompt children's thinking about the current situation that they witness in Ricky's life, and to encourage children to respond wisely based on the learning materials given during the online workshop.

The e-comic is divided into 3 topics:

1. Good vs. Bad Stranger – an introduction of the concept and characteristics of good and bad stranger;

2. Home alone – featuring 5 real-life scenarios related to danger of staying alone at home; and

3. Online stranger – a special topic on how to recognize and tips to avoid bad strangers when playing online games.

The e-comic is developed in dual language: Bahasa Melayu (https://bit.ly/2SV6SE5) and English (https://bit.ly/3bsjpoQ) . It is a self-learn material embedded with links to various educational **videos** related to the topics, and interactive **quizzes** to self-reflect of their understanding. Problem-based learning (PBL) approach was integrated in the design of the real-life scenarios to support children's learning ideas and values, rather than a direct presentation of facts and concepts.

The e-comic is accessible online via laptops, smartphones, iPad, or any other devices. The e-comic can also be saved as a PDF and printable so that any parents and teachers interested in teaching the topic can easily re-use the learning materials in their own contexts. Figures 1 to 4 presents excerpts of the e-comic content.
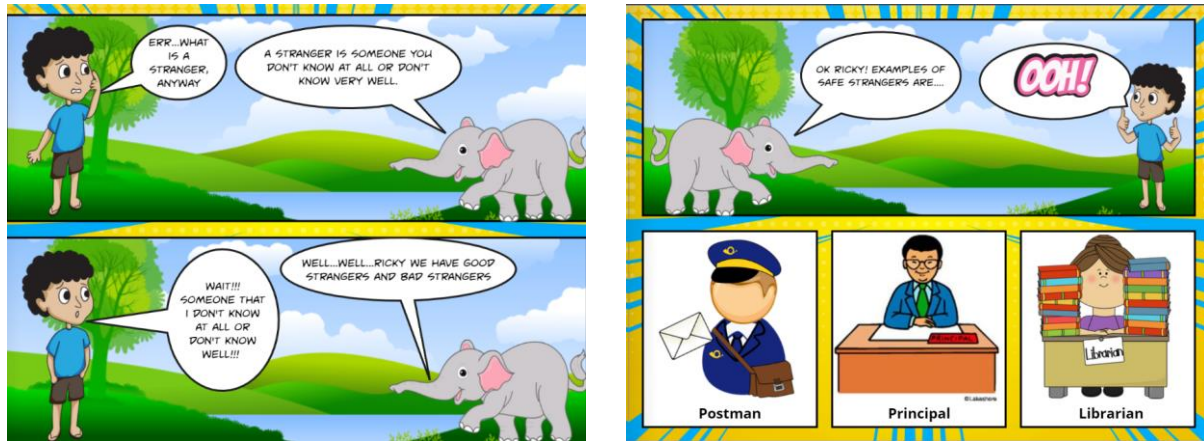
Figure 1: Excerpts of the e-comic, Good vs. Bad Stranger topic.
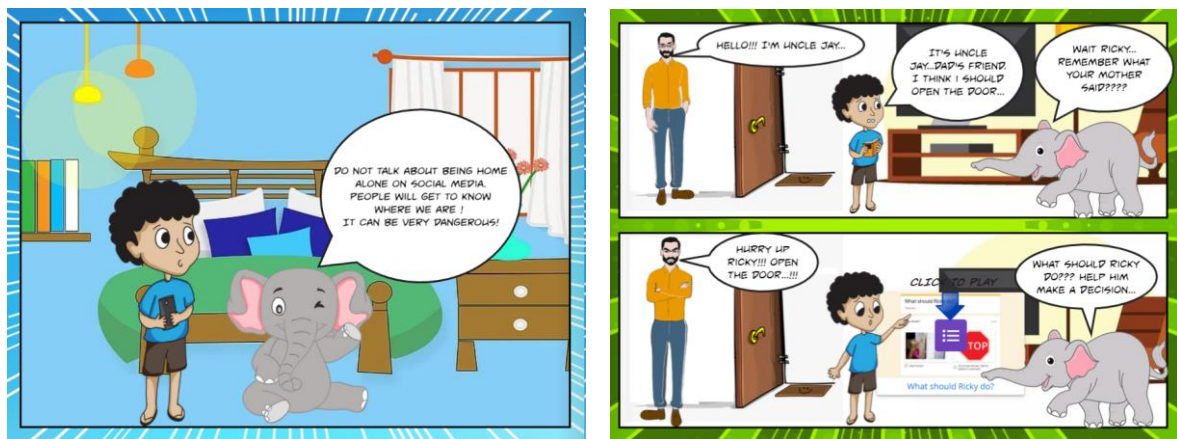
Figure 2: Excerpts of the e-comic, Home Alone topic.
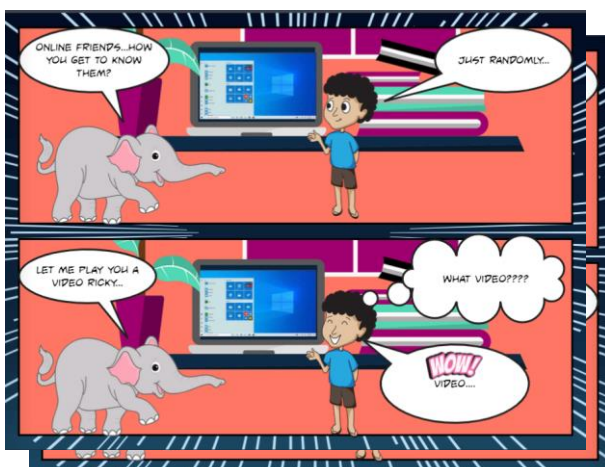
Figure 3: Excerpts of the e-comic, Online Stranger topic.

Figure 4: Interactive elements embedded in the e-comic are accessible online too.

2. Delivery and implementation of the project via online Zoom workshop

A synchronous online workshop was conducted via Zoom to a group of 40 children age 7 to 10 years old.

The workshop started with introduction to the instructors and topics that will be covered. The children were then assigned to 3 break-out rooms accompanied by 3 instructors. All activities were carried out in the break-out rooms, facilitated by the instructors. The children watched the pre-created videos, discussed about the content of each videos, took part in the quizzes if they would like to and drew an individual poster that reflected their understanding of stranger danger topics. All of these posters were uploaded to the project's Padlet to be judged later. Winners of this poster-making competition were announced in the project's WhatsApp group and gifts were mailed to their respective addresses. Once the break-out room activities were completed, all 3 groups met again in the main room. In this final phase, the lead instructor briefly summarized the topics that the children previously learned in break-out session and invited selected children to share their posters with the whole group. **Appendix A** (at the end of this paper) presents some screenshots from the online workshop.

An online survey was sent to the parents of the children, to assess their children's perceptions of the effectiveness of the workshop and online learning materials. Only 16 parents participated in the survey and 91.35% of them agreed that the project was very important and beneficial to their children. They also requested that the online workshop to be repeated again in future.

Commercial value

All materials developed in this project are made freely available online to encourage other parents and teachers to spread the initiative. However, the e-comic is currently filed for copyright under Universiti Malaya with the intention that it can be further be developed, published and shared to public.

Acknowledgement

This e-comic is mainly focused on what young children are supposed to do when they are alone at home and how they should do it. We would like to dedicate this e-comic to our audience who were willing to participate in our community project, entitled 'Stranger Danger.' This project is aimed at creating awareness of the many possible dangers posed by strangers.

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APPENDIX A
Screenshots from the online workshop
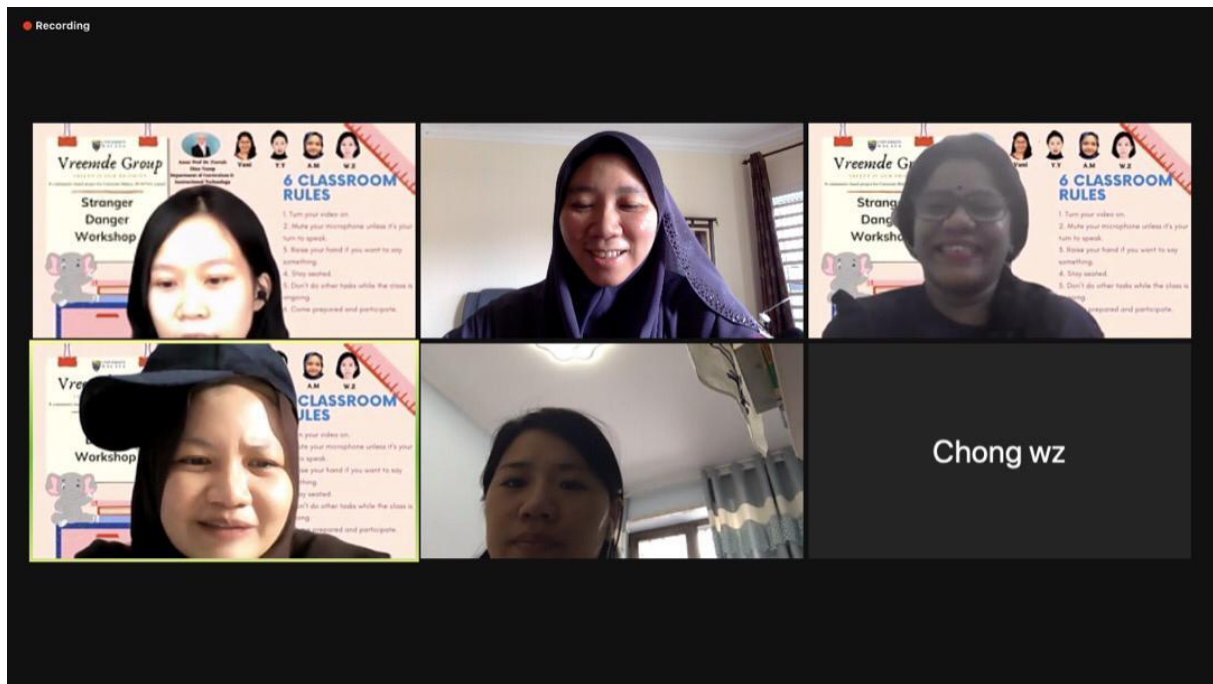
Caption: The team members

Caption: Children listened to the instructor's presentation
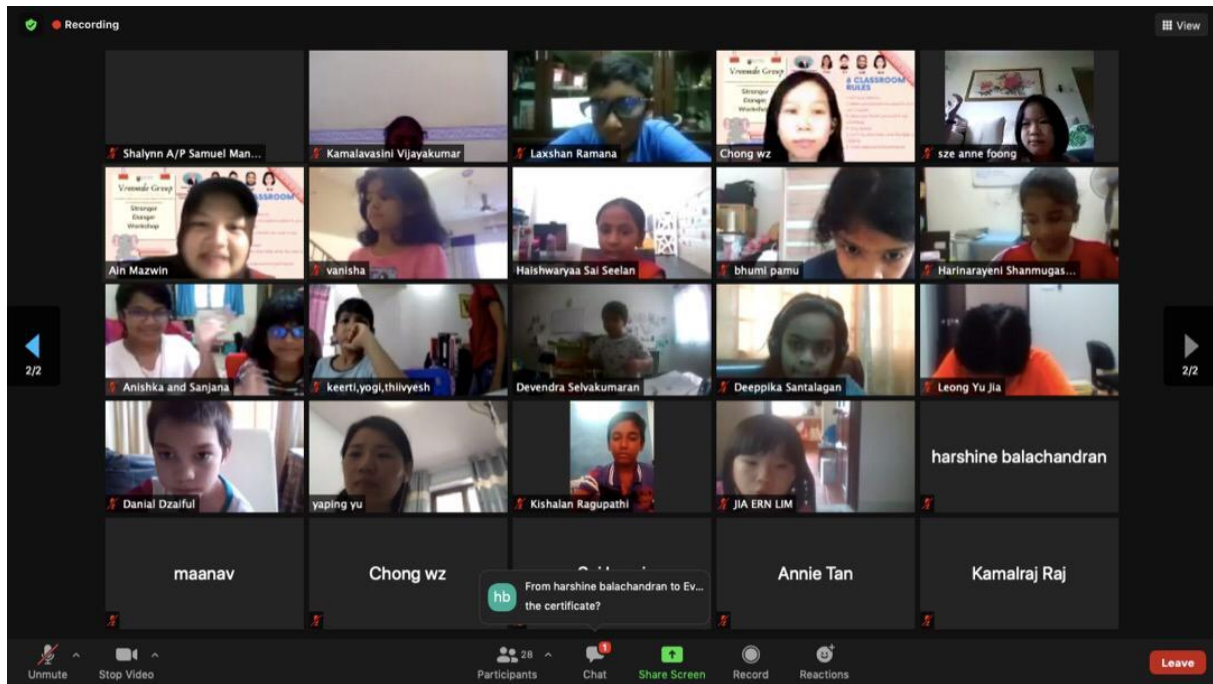
Caption: Some of the children-participants
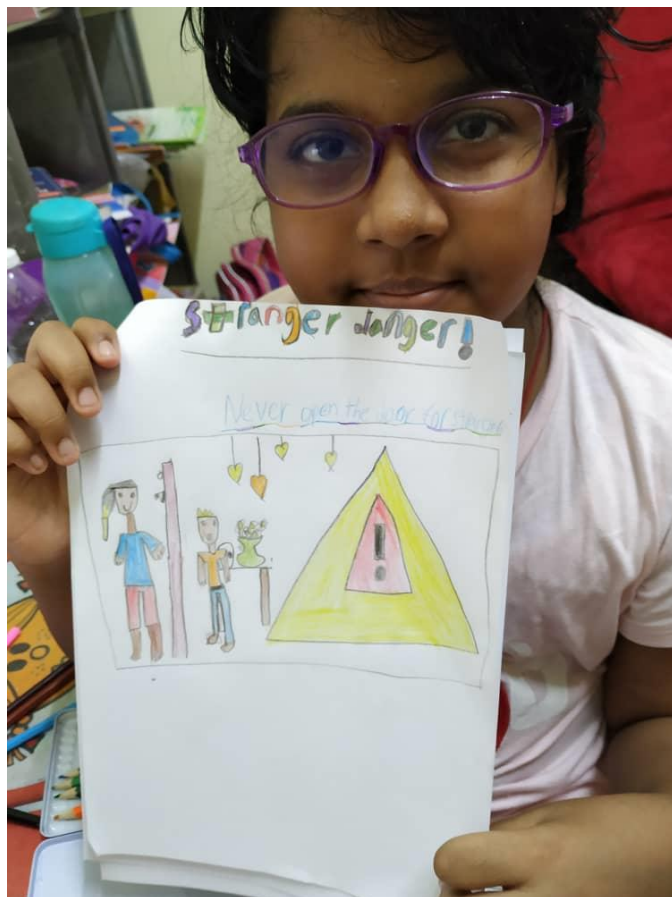
Caption: A child shared her poster during the sharing session

Caption: A child shared her poster during the sharing session

Caption: A child shared her poster during the sharing session
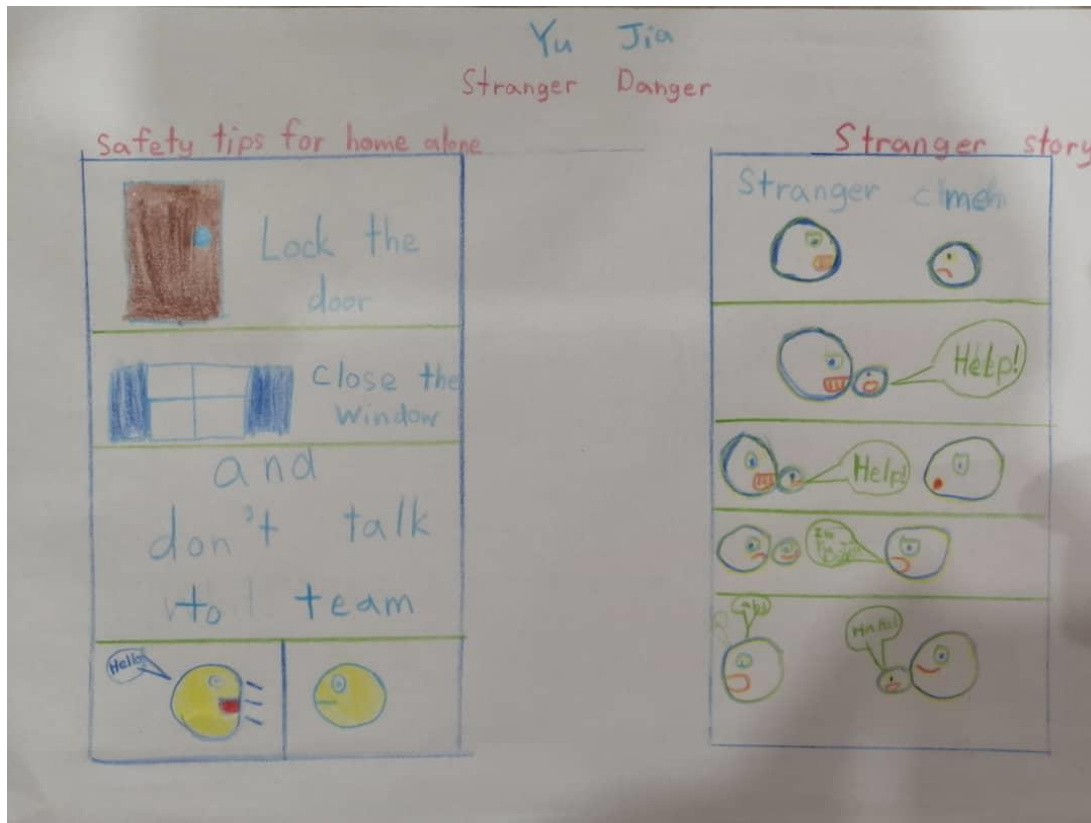
Caption: Some of the posters made by the children to be judged for the poster-making competition.

PLOPOR3.0

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Highlights: In 2020, PLOPOR© has been used to monitor PLO achievements for Bachelor of Biomedical Science in UniSZA. With 18 PLOs that are required to be achieve and for the program to be successfully accredited by MQA in 2020, hence a full report of Area 1: Program Delivery is produced. The effectiveness of all PLO attainments can now be shown in one full report, thus reducing the implication of non-compliances during MQA accreditation or internal audit.

Key words: plo, attainments, accreditation, audit, report, cqi

Introduction

Programme monitoring and evaluation (M&E) is a periodic and continuous, conducted after program initiation and during the duration of that program or intervention. The data acquired is primarily involved all input and output focused, stakeholders and is generally used as an ongoing strategy to determine the efficiency of implementation of ay academic programme in different cohort while providing evidence to facilitate the needs for quality improvement within 3 to 5 years upon student graduation. The overwhelming number of M&E assessments has been time-consuming and limited to report any non-compliance activity and providing and overall output report to the school management.

Hence PLOPOR©, is an integrated data collection prototype system used as programme M&E tool in which now enter its second phase 2.0 in 2020, the system will be introduced across 32 undergraduate degree programs, 25 diploma, and even Masters and Doctoral programs at UniSZA or any institutions accredited by MQA.

PLOPOR© aims to provide an integrated computer system model for data filling of CQI reports, surveys, program mapping and course evaluation by students in every semester, analyze the attainment of program learning outcomes (PLOs) based on key performance index (KPIs) provided by the program and provide semiannual learning outcomes (PLO) reports to facilitate the monitoring progress of the study program.

The system as expected facilitates the study program in monitoring the effectiveness of a course or teaching and learning (T&L) activity set through the domain of the course learning outcomes (CLO) as well as program learning outcomes (18 PLOs). Identified any non-compliances of teaching and learning (T&L) as well as type of assessment implement throughout the course of the study.

Assessment on academic feasibility aims at making sure that all resources are being used efficiently and effectively, and that the benefits will be sustained and contributes to better graduate employability.

Content

Description of your innovation / product development / design / process.

PLOPOR (PLO-Portal) is an Excel-integrated computer model that:

*Monitors the effectiveness of PLO attainment by semester/annual.

*Generates CDL2 report (cohort basis) semiannually.

*Requirement for quality assurance in programme development and delivery, accredited by MQA or any professional bodies.

What is the context or background of the innovation / product development / design / process?

PLOPOR© involved the analytic compilation of all subjects CQI's report in one integrated system that generates CDL2 and CDL3 reports; mainly used for programme monitoring and accreditation.

Why are they important to education?

PLOPOR© can avoid the unintended variation in processes (CLO/TLAs/ATs/SLT) which lead to unwanted variation in programme outcomes.

With ONE full generated report from PLOPOR©, it supports other big data such as OBE-SCL implementation, entrance-exit data survey and other teaching learning data surveys conducted throughout the semesters.

Please write any advantages of your innovation / product development / design / process towards education and community.

The effectiveness of a study program in terms of teaching and learning (PnP) and the assessment method used were constantly updated in line with the development of current knowledge which leads to the demands of an industrial revolution 4.0 (IR4.0).

Through this report, during the refinement of the curriculum, students in each cohort are exposed to the variety and latest teaching methods and learning strategies that will enhance student's cognitive and other soft skill abilities along with the requirements and objectives of the study program.

UniSZA CDL - CQI monitoring program can NOW be conducted continuously on a cohort basis and this method is known be more transparent to ensure that the quality of the study program meets the current global market.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

Applicable for all undergraduate and postgraduate programmes in all government and private universities/colleges and other education institutions accredited by Ministry of Higher Education (MOHE), whether to be use for semiannual report, preparation for audit process and even accreditation by MQA/professional bodies.

The system is also flexible to any type of primary and secondary school's data management based on Ministry of Education (MOE) policy/guide.

Acknowledgement

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ENGLISH-MOOC FOR PRE-DIPLOMA STUDENTS

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Highlights: English-MOOC is a massive open online course designed by using the theory of VARK (Visual, Aural, Write/Read, Kinesthetic) to cater the different needs of pre-diploma students. The novelty of this product lies in the designing features of the MOOC by following the intrinsically motivating instruction defined by Malone that provides learners with three main features: challenge, curiosity, and fantasy. The course content is designed by using student-centred, active and social learning pedagogical principles including active activities for assessments, curating content for learning engagement, and updated course content. There are 6 main engaged modules with rich media content and constructing activities.

Key words: MOOC, pre-diploma, online learning, jumbled-up lyrics, instructional technology

Introduction

At present, higher education institutions are progressively developing a positive attitude towards MOOCs and countless positive experiences have been shared which has added values to the MOOCs. Most importantly, the number of MOOCs has increased enormously in Malaysia; a sign indicating the peak of MOOC among higher tertiary education (Collins, 2018).

English MOOC for Pre-Diploma Students is an online course designed to improve the English proficiency level among pre-diploma students (Daneil, 2019). The course aims to do this through an integration of reading, listening, writing and speaking skills with appropriate consideration given to grammar by using a variety of materials. The course is designed by using the theory of VARK (Visual, Aural, Write/Read, Kinesthetic) and integrating various types of assessments that fit the required assessments as stated in the syllabus. The novelty of the online course lies in the integration of different secondary applications in the MOOC platform to create interesting and challenging exercises and assessments. For instance, the integration of mix and match quiz method is fully utilized to create a listening assessment namely Jumbled-up Lyrics (Daneil, 2019). Besides that, the use of Kahoot! to teach grammar is also added for practice purposes. These exercises help the students to learn grammar and to practice their listening skills and prepare themselves for the listening test in accordance with the syllabus. This MOOC can be used for all learners who wish to improve their English proficiency as the content and the assessments are suitable for all beginners and intermediate level of learners.

This English MOOC course has won the following awards: Best MOOC Award and Most Active MOOC in UiTM. The overall content of this MOOC has been evaluated by experts with: Content Evaluation 86.11%, Language Evaluation 87.5% and Design Evaluation 93.75%. There is no set time frame; students can do the activities when it suits them best.

Content

This product is registered with MyIPO LY2018000800. This course is designed to improve the proficiency level of pre-diploma students (Daneil, 2019). The course aims to do this through an integration of reading, listening, writing and speaking skills with appropriate consideration given to grammar, using a variety of materials. There are 1020 learners enrolled in this online course and the course is available online at https://www.openlearning.com/courses/english-for-pre-diploma-1/?cl=1. The content of the course is based on the lecture materials such as lecture notes, slides and lecture videos used for the course in the conventional face-to-face class. The lecture notes in the MOOC course are downloadable to all registered students in the mixed form of various types of files such as pdf, word documents, PowerPoint slides and jpeg form. Students are required to leave their opinions in the chat section in order to ensure they have viewed the lesson in each page. Besides that, opinions left in the discussion section provide room for collaborative learning to foster more meaningful and attainment among the learners. By using this platform, instructors can keep track of their learners' opinions and interact with them to engage and create a fun teaching and learning process. For example, one of the sections in the navigation bar of the course is the "Smash-Hits!" section in which students will listen to various types of English songs and arrange the lyrics according to the right sequence (Daneil, 2018). By utilizing the mix and match quiz widget provided by Openlearning.com, this activity is a fun and effective way to help students to improve their listening skills. In addition, the "Smash-Hits!" section was affiliated with the course assessment outline in the syllabus. Figure below shows the inventiveness and novelty of this online course.

Figure 1: Inventiveness and Novelty of the Course

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E-HAJJ

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Highlights: *E-HAJJ* adalah inovasi gabungan apps dan buku digital yang menggarapkan maklumat yang padat tentang haji dan umrah. Pelaksanaan haji dan umrah terlalu kompleks untuk difahami bagi orang yang kali pertama mempelajarinya. Malah pembahagian haji kepada tiga jenis haji juga mengelirukan jika kaedah konvensional digunakan. Jadi *E-HAJJ* dicipta untuk memberi kefahaman yang mantap untuk memahami topik Haji dan Umrah dalam bentuk multimedia dan teknologi melalui apps atau buku. *E-HAJJ* sangat membantu proses menganalisis kefahaman dan mengaplikasi ibadat haji dan umrah. Ia mampu memberi gambaran yang jelas pelaksanaan haji dan umrah dan mampu menyelesaikan masalah yang berkaitan. Infomasi dan maklumat dalam *E-HAJJ* digarap dengan gambar, video dan audio yang amat jelas.

Kata kunci: E-Hajj, apps dan buku, QR Code, interaktif, telefon pintar

Introduction

Proses pengajaran yang berkesan dapat dicapai sekiranya bahan bantu mengajar dapat merangsang hampir kesemua deria murid, contohnya melalui E-Hajj. Ia merupakan suatu media yang boleh merangsang hampir kesemua deria murid. Menurut Ikhsan dan Norilla (2005), tahap keberkesananproses pengajaran dan pembelajaran jika menggunakan deria penglihatan 75%, pendengaran 13%, sentuhan 6%, rasa 3% dan hidu 3%.

Jadi teori yang bersesuaian dengan inovasi ini ialah teori kecerdasan pelbagai oleh Gardner (2006) yang memberi ruang untuk pelajar mengembangkan potensi yang ada dalam diri mereka. Ini menjadikan mereka semakin minat dengan pelajaran dan dapat memperkembangkan potensi yang ada pada diri mereka. Dua kecerdasan telah digabungkan dalam inovasi ini iaitu verbal/ linguistik dan visual/ spatial. Ini akan menjauhkan perasaan bosan dalam kelas dan menarik minat para pelajar terhadap pdpc haji dan umrah.

Content

E-HAJJ adalah suatu inovasi pedagogi dan produk yang hebat berkaitan dengan ibadah haji dan umrah. Ia adalah gabungan apps dan buku digital yang berwarna terang, menarik dan mempunyai makna tertentu telah diterangkan melalui petunjuk warna. *E-HAJJ* mesra pengguna dan amat interaktif kerana boleh dicapai melalui Kod QR di mana-mana dan bila-bila masa sahaja melalui pelbagai jenis telefon pintar dan komputer. Apps *E-HAJJ* adalah percuma dan disebarluaskan melalui *whatsapp* dan *facebook*. Buku dipasarkan di *Shoppe* dengan harga RM28 sahaja. Diwujudkan dalam dwibahasa iaitu Bahasa Melayu dan Bahasa Inggeris supaya sesuai sehingga peringkat antarabangsa. Impak yang paling hebat ialah boleh digunakan pada semua peringkat umur, bahasa dan bangsa dan merentas sempadan masa dan tempat.

E-HAJJ berjaya disebarluaskan kepada semua peringkat masyarakat samada murid sekolah, pelajar IPT, para pendidik, masyarakat awam. Penggunaan apps Eazee Hajj secara percuma boleh didownload daripada Google Playstore pada bila-bila masa dan dimana sahaja.

QR kod juga merupalan akses alternatif yang boleh digunakan. Berdasarkan halaman utama QR kod didapati pengunjung apps ini tercatat seramai 2351 orang di seluruh dunia.

Tarikh mula dilaksanakan adalah pada 24 Mac 2019 ke atas dua kumpulan guru Dini (40 orang) yang mengikuti Kursus dalam Cuti (KDC) di IPG Kampus Tuanku Bainun (IPGKTB). Seterusnya dilaksanakan dalam kalangan pelajar IPG PPSMP Sem 1 Amb. Jan 2019 (150 orang) PISMP Sem 8 (14 orang) Pengajian Agama dan 100 pelajar PPSMP Sem 1 Amb Ogos 2020 di IPGKTB.

Bukan ini sahaja E-HAJJ turut berkolaborasi dengan Lembaga Tabung Haji untuk semakan fakta, menjadikan dua orang Pengkuliah Tabung Haji & Mutawwif menjadi pakar runding untuk inovasi ini dan sedang mencari masa dan ruang untuk membentangkannya di Jabatan Mufti Kedah dan Pulau Pinang untuk tambah nilai inovasi ini dan beberapa ilmuwan sarjana Islam di IPT

Pernah juga dilaksanakan kepada murid sekolah Tingkatan 4 dan Tingkatan 5 oleh guru Pendidikan Islam di beberapa buah sekolah menengah di negeri Kedah, Pulau Pinang, Perak dan Perlis iaitu di Sekolah Menengah Sukan Bukit Jalil, Selangor, SMK Kota Kuala Muda, Kedah, SMKA Arau, Perlis, SABK al-Hidayah, Perak dan SABK Maahad Islahiah Addiniah, Perak. *E-HAJJ* berevolusi seiring dengan masa, bermula dengan paparan slaid powerpoint yang diinteraktifkan kemudian ditingkatkan kepada apps yang sangat mudah diakses secara online atau offline. Yang terkini ialah terhasilnya buku digital Eazee Hajj.

E-HAJJ atau Eazee Hajj direkacipta tanpa sebarang kos supaya semua pelajar mampu memuat turun aplikasi ini. Ia amat menarik, mesra pengguna, boleh digunakan dan mudah dibawa ke mana-mana. Merupakan suatu alat pdpc yang menarik dan sangat membantu pelajar dan guru bermula dari peringkat menengah hingga ke peringkat pengajian tinggi malah masyarakat awam di luar yang ingin menunaikan haji dan umrah.

Ia turut disebarluaskan dengan memasuki pertandingan Inovasi yang dianjurkan oleh IPGM, Universiti dan IPTS. Malah turut memberi ceramah dan taklimat tentang inovasi yang dicipta kepada para pensyarah, pelajar dan orang awam. *E-HAJJ* sekarang disebarluaskan melalui penerbitan Buku Eazee Hajj cetakan Sept 2020 dengan harga RM25 sahaja ke sekolah-sekolah, IPT, pendidik dan orang awam.

Eazee Hajj telah mendapat pengiktirafan daripada MYIPO pada **tarikh. pada 25 Jun 2018 dengan nombor aplikasi LY2018002515**

Impak

Impak E-HAJJ dapat dilihat dengan jelas pada perbezaan markah Ujian Pra dan Ujian Pasca seperti berikut Jadual 1: Keputusan Ujian Pra dan Ujian Pasca dan perbezaan peratusnya

	Ujian Pra (%)	Ujian Pasca(%)	Perbezaan(%)
	91.2	98.4	+7.2
	38,9	88.7	+49.8
	40.7	95.2	+54.5
	29.0	71.o	+42
	61.0	82.4	+21.4

Ternyata terdapat peningkatan markah ujian pasca selepas penggunaan inovasi E-HAJJ. Peningkatan paling ketara pada soalan 3 dan 2

Berdasarkan soal selidik diedarkan maklumbalas daripada pengguna jelas menunjukkan

566

Rajah 1: Dapatan soal selidik terhadap pengguna E-HAJJ

1. Adakah bahan inovasi ini membantu anda /guru bagi topik Haji dan Umrah
88 i"esoonses
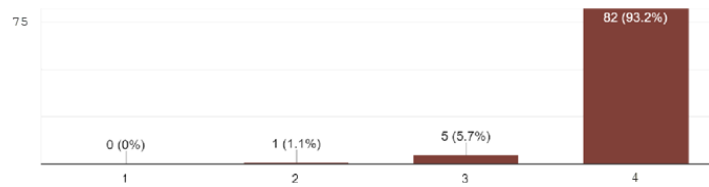
2. Adakah Haji dan Umrah mudah difahami melalui Eazee Hajj
88 re sa anses
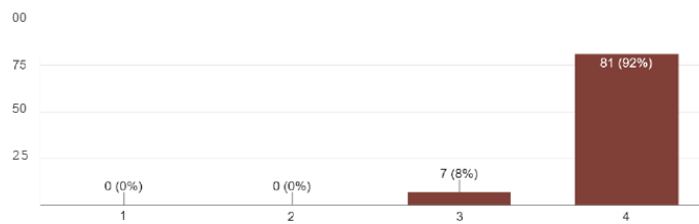
3. Adakah Eazee Hajj ini mesra pengguna
88 responses
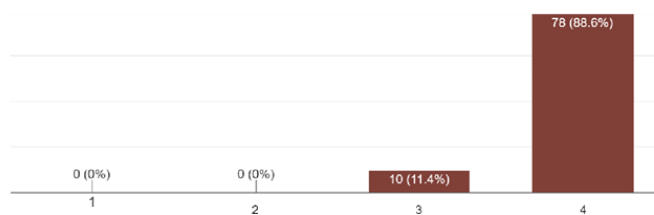
Siapakah anda
88 responses
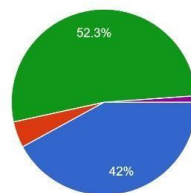
- Guru Sekolah Rendah/ Menengah
- Pensyarah
- Murid Sekolah
- Pelajar Universiti/IPT
- Mutawwif
- Orang Awam

Impak E-HAJJ sangat jelas apabila 88 responden terdiri dari pelbagai pihak samada pendidik atau pelajar serta orang awam. Dapatan menunjukkan majoriti responden setuju (skala 3) dan sangat setuju (skala 4) pada persoalan yang dikemukakan. Impak yang paling hebat ialah boleh digunakan pada semua peringkat umur, bahasa dan bangsa dan merentas sempadan masa dan tempat.

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GONG APP Version 1.0: A MOBILE LEARNING APPLICATION AS A TOOL FOR INDIGENOUS LANGUAGE TOWARD PRIMARY SCHOOL AGE CHILDREN

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Highlights: The popularity of educational application is growing fast. Gong App, a language learning mobile application aims to make an exposure about indigenous language (Foochow dialect), for Foochowese primary school age children (7 to 12 years old) as they are unfamiliar with the language. Gong App helps to prevent the death of indigenous language among young generations as they are interacting in other languages every day. This app focuses on the process of self-learning through mobile application with gamification elements including colourful learning components, animations, rewards, etc., that intends to make the learning process more interesting and enjoyable for the children, as well as effective learning process. Their cognitive skills and ability, and pedagogical standards are also considered in term of the topics and quizzes contents of the app.

Key words: Mobile-based learning app, self-learning, cognitive science, indigenous language, gamification, children's UX, Ionic Framework.

Abstract

At present, it is estimated that one indigenous language dies every two weeks as indigenous people make up less than 6% of the world population, and at the same time they speak more than 4000 of the world's languages in everyday communications (Othman, 2017). According to Ting and Sussex (2002), 8 out of 10 Foochow participants from a study ranked English as the most important language. Nevertheless, in communication with children, English is preferred over Foochow which results in their children not knowing their indigenous language unless they learn it from older family members (Ting & Sussex, 2002). The inexistence of technological instrument to support the learning process of indigenous languages is also one of the general problems for this issue. So, the central idea of Gong App is to reduce the various gaps regarding the knowledge of the Foochow culture, especially the Foochow dialect, and to introduce it as an interactive learning instrument through gamification. Therefore, this project aims at strengthening the cultural identity and knowledge about indigenous language among primary school age children and to let them get a hands- on experience in mobile-based learning to motivate and enhance their learning process.

The methodology utilized for this system is ADDIE, an Instructional System Design (ISD) that provides useful, clearly defined stages for a productive implementation of instruction (Shminan et al., 2017). ADDIE framework is a cyclical process consisting of five phases: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation that alters over time and it will continue throughout the instructional planning and implementation process

(Muslimin et al., 2017). During the design phase, 'ADOBE XD' is used to create the high-fidelity prototype and 'Ionic Framework' is used to build the design blueprint for the development phase. For the evaluation, usability testing, questionnaires, and interview session are made.

At present, online distance learning is affecting both students and the teachers. Gong App, which the target users are primary school children allows the exposure of modern e-learning techniques for children users to learn at their own pace, enjoyably and effectively by themselves without the need of constant instruction or supervision from the adults, as most of parents are currently struggling to balance their career and children's education. This helps to create a convenience, interactivity, and fresh modern e-learning solution, which is also great opportunity to introduce something revolutionary in everyday life.

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CHEMISTREE: AUGMENTED REALITY APPROACH IN TEACHING AND LEARNING

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Highlights: This article highlights on the innovative and creative approach for student engagement in learning chemistry at Matriculation College. Chemistry concepts and theory were thought either in the classroom (face to face) or online teaching through various platform. ChemisTree is an innovative approach to enhance students' engagement with chemistry subjects by providing virtual notes using Blippar application.

Key words: chemistry, virtual notes, ChemisTree, Blippar, students' engagement.

Introduction

Chemistry is one of the subjects that seen by many learners as a complex and difficult subject to learn either in schools or in higher institution. In Matriculation College, chemistry concept was thought via cotemporary ways via lecture, tutorial and laboratory practice. Students were given printed notes and manual for the lecture and laboratory. A combination of learning techniques using online platform and application of augmented reality application is purposed to enhance student's engagement with chemistry subjects either inside or outside the classroom. This is aligned with what Gen Z students do best which is technology reliant, learn by doing, enjoy interactive classrooms instead of dissemination teaching method and expect that learning can take place anytime and anywhere (Kozinsky, 2017).

Innovation

Education is a practice of artistic action where learning process of learning is considered as design and knowledge is consider as a color (Duke, 1990). Education system nowadays have been influenced by the development of many new technology which is seen from the emergence of various media-based learning used in teaching and learning processes. The usage of many free media-based learning system in teaching and learning nowadays is capable to assist student to explore and have better understanding of the subject matter. The main challenge in teaching and learning is how to attract student interest to the subject matter in order to gain students involvement throughout the teaching and learning process.

Based on the conservative methods applied in chemistry lectures, learners had difficulty in visualizing and applying knowledge practically. Hence, in order to sustain the learning process of this course some enhancement is required. In this paper, it is proposed to incorporate virtual objects when blended with real world. It is aimed to amalgamate entertainment and study

by providing immersive learning experience to learners. The expectation with this enhancement is to impart a great deal of knowledge and better learning outcomes for chemistry subjects.

ChemisTree is one of the teaching and learning approach using augmented reality application to enhance student's engagement in learning chemistry at anytime and anywhere. This innovation is using Blippar application in producing virtual notes to the students. Each ChemisTree will represent one topic or one chapter in chemistry subject. The initial idea of this innovation is to give students easy access to chemistry notes which contain videos, lecture notes and many extra notes related to the topic for better understanding. The better visualization of the content keeps learners active during the learning process as it enhances human ability to understand and process information (Serio et.al., 2013). Figure 1 shown one of the examples of ChemisTree.
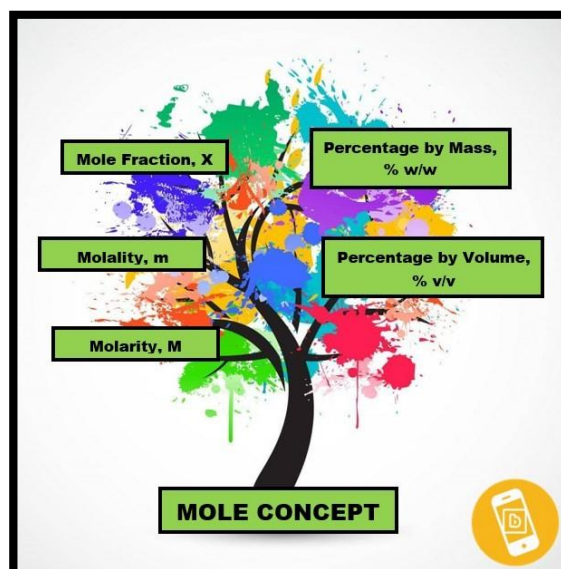
Figure 1: Example of ChemisTree

ChemisTree is using AR and multimedia element to increase the motivation of student in order to learn chemistry. These elements may capture learners' interest and attention to continue learning. In other words, ChemisTree can be used as a knowledge card. By download Blippar application in their mobile phone, students just need to scan the topic on the ChemisTree that they required further information (Figure 2). By using ChemisTree, students do not have to carry heavy paper notes in campus or even returning to their respective homes. It is hope that this innovation will enhance students' understanding to chemistry theories especially during their self-learning hours that can take place anywhere, anytime and everywhere. Besides that, ChemisTree will be one of the products that has potential to commercialize in all education sectors from primary until to the highest-level education and it also can be used for private tuition or personal teaching by parents at home.
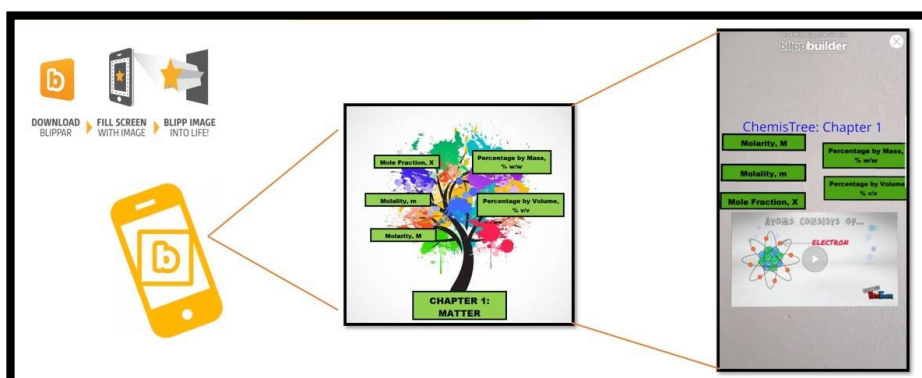
Figure 2: Application of ChemisTree

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InVesa 1.0: THE CONCEPTUAL FRAMEWORK OF INTERACTIVE VIRTUAL ACADEMIC ADVISOR SYSTEM PROTOTYPE BASED ON PSYCHOLOGICAL PROFILES

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Highlights: Interactive Virtual Academic System Prototype (InVesa) is a conceptual automated system dedicated to students where a theory of personality test is integrated to aid student selects the ideal elective subjects for their Cognitive Science course. With InVesa, rather than give alerts to academic advisors, students are assigned personalized advice by the system on the recommended elective subjects based on their psychological result. A student may choose to accept a list of subjects' recommendations from the system or to retake the psychological profile test until they are satisfied with the suggested subjects provided by the system. In addition, students with less time meeting their academic advisors to consult on their subject enrolment may avoid general issues that are common in the standard appointment registration system such as multiple registrations and long queues when scheduling an appointment. It can be concluded that the proposed application, meets the requirements. The proposed application provides a convenient and efficient solution to gain the required information and will benefit the targeted user which align to the 4th goal of Sustainable Development Goals (SDG) of Quality Education for better education quality for all regarding gender, age and status. A ruled-based expert system approach used in help providing the recommending courses based on their academic result and also their psychological profiles.

Key words: *Academic advisor expert system, Cognitive science, Psychological profile, Ruled-Based.*

Introduction

It is important for students to make the right decision in selecting their courses especially in deciding upon their major that will affect their results and paths in the future for the next few years in the university. The choices they make define their future careers and determine the nature of their specialization in a specific academic domain. Daramola et al., (2014), Zhang et al., (2019) and (Shminan & Othman, 2015) stated that preferences and interest always be the base for students' career decisions, without considering the requirement of their own abilities and facilities required for a certain major. This might lead to critical consequences, which also affects the students' performance, psychology and personal life. Not only that, they also tend to choose the major courses not because they want it nor like it but merely to follow their friends, as some are quite uncertain of what they want to be in the future. As a result, they start to regret their choices. Student academic advising is an essential task in educational institutions, especially at university level. Some students might have a clear path about their future while some are still in doubt and are still uncertain of what to do. An academic advisor is assigned to every student during their first year to allow students to seek

for advice whenever they have doubts or uncertainty such as about the courses they want to choose. However, this process is quite time consuming as the academic advisor will need to understand the students' interest, situation, and current academic results to know what is suitable for the students. The quality of academic advising received by a student is crucial to the overall performance of the student. Good advising yields a good outcome while bad advising will be frustrating and have a damaging effect on students' progress.

To align the 4th goal of Sustainable Development Goals (SDG) which is quality education (Owens, 2017), the development of INVESA is to ensure that the students are able to know more about themselves in choosing the subjects to prevent the loss of interest towards their courses and subjects. This allow the students to be able to graduate on time as they do not need to hold back a year due to the inability to catch up on the subjects that are beyond their interest or ability. A number of researchers, for example (Zhang et al., 2019),(Daramola et al., 2014), and (Loucif et al., 2020) identified the application of academic advising program, huge benefits for improving the quality of students' learning and development outcomes. Using the advancement of information communication and technology (ICT) to sustain the advisory program would allow both students and universities to keep the news of successes of graduates or the dropout percentage up to date.

This study proposes an expert system, artificial intelligence programs that try to emulate the judgment of human expertise, as an advisor that is able to provide the procedures of academic guidance for the students as a first point of call. The advisor proposed utilizes rule-based expert system that guides the students through planning arrival, registrations, semester's course schedule issues, as well as other miscellaneous needs. It incorporates program information, student data and information and faculty handbook and university requirements to considerably guide the students from committing errors that may be costly in the long run. The rule-based expert system is then utilized to place the students in the classes appropriate for their placement scores, major, degree requirements, and academic preparedness, with a view to alleviating the aforementioned issues.

InVESA have been developed properly with the application of RAD Methodology and Human-Computer Interaction principles (HCI) model. The content or conceptual framework and the prototype application have been assessed by experts and the motivation of the target users using the prototype InVESA application have been analyzed. The usefulness of the application is amply demonstrated via its many positive effect on target users. Future works may also be integrated with interesting interface design, multilingual platforms and combination of other approach in system application as a ruled-based system. This proposed application system is potentially not only can be used for both single program and faculty administrative, but also the whole institution, in helping the students to select their desired course.

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HANDLING BIG GROUPS EFFECTIVELY USING MOODLE AS LEARNING MANAGEMENT SYSTEM (LMS)

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5.   **Highlights**: In this work, we wish to showcase how features in Moodle application are useful in helping lecturers to structure their course page effectively especially when it involves big groups. We strongly believe, wrong ways of organizing materials inside a course page with big groups can hamper students' interest and experience in online learning. By further elaborate the features, it can help the lecturers to design, arrange, plan and conduct their online learning in the correct way and it will also contribute to students' achievements in the long run.

6.

Key words: online learning, mathematics, moodle, learning management system

Introduction

The learning management system (LMS) is a software application that is created to carry works related to reporting, documentation and tracking list of activities of users. Higher education provider used LMS to share their e-Learning materials with students. This is very useful to them as this platform serves as one stop center for the students to access e-learning materials. Through some web searching, it can be seen Moodle is one of the common applications being used by local universities in Malaysia as their official LMS. Moodle was chosen as a Learning Management System (LMS) in this study because it presents an excellent platform for resources and communication tools which has some privilege features, namely: discussion forum, file exchange, email notification, notification dashboard, progress review, searching within course, and module page as well as optimized architecture compared with other e-learning systems (Febliza et. al, 2020), Besides that, Moodle also allows cooperation among learners, lecturers and students (Chourishi,2012)

Normally, University subjects such as language and mathematics related courses are subjects that often receive a lot of students register at a semester. The students are grouped into section that consists of 60 – 70 students subject to availability. This subject normally will be taught by a group of lecturers usually 4 – 6 of them, depends on the arrangement from the faculty. The subjects that are offered at that semester will be getting a course page inside the LMS.

The problems occur when the summative and formative assessment are conducted and the lecturers of the selected groups would like to create exclusive content for his/her groups which cannot be accessed by other groups. Before this, the lecturers tend to create the assessment via Quiz and Assignment modules separately. For instance, if they have 11 groups, they will duplicate the assessment for 11 times. By using this method, it will burden the lecturers to repeat the process of duplication. In addition to that, duplicating the assessment for many times will resulting to the heavy load of course page and consequently affect the students experience in opening the course page. This would not be the case if best practices are applied in handling big group using features available in the Moodle. Other than that, best practices will also help the course page to be able to load faster and it will improve students' experience in accessing all the contents available in the course page.

Content

The contents of this work will be elaborated by answering the following questions

1. Description of your innovation / product development / design / process.

   Designing a framework to help the lecturer with big groups to design their course page using the best practices in Moodle application of their LMS

2. What is the context or background of the innovation / product development / design / process?

   Correct way of structuring contents and materials inside Moodle based LMS especially for subjects with big groups is important as it will help in improving students' experience with the LMS which will help them to understand the subject better. Besides, lecturers will be able to tailor the contents according to their needs.

3. Why are they important to education?

   Nowadays with the pandemic faced by all of us, we have shifted to online learning. With this sudden shift away from the classroom, lecturers are required to create the effective online site i.e. Moodle. However, if the numbers of students are enormous, the process of managing the online site can be quite complex especially when the instructor duplicate too many materials/assessments. By demonstrating the correct practices to instructor, it will help the site Moodle to function at its best and also able to help the student learning things efficiently. User experience are important when it comes to online learning.

4. Please write any advantages of your innovation / product development / design / process towards education and community.

   The advantages are the framework of applying best practices in creating course page with big groups are easy to follow, it will improve user experience when opening the course page and course page will be more organize and less clustered

5. Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

   Not applicable since this work is to highlight things that are missing when designing a course page in the Moodle

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CITRA ANGKASA: USING SPACE INDUSTRY AS A TOOL FOR DEVELOPING CAREER-PROOF CURRICULUM

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Highlights: It is widely known that space industries are a niche field requiring niche knowledge, and by that, it would pigeonhole future students to a niche career. However, suppose we neglect that paradigm and focus on the modes of thinking associated with the space industries; the knowledge will be helpful to enhance students' application of high-level thinking for their career across disciplines. As a SOLUTION, the design of CITRA ANGKASA module aimed to incorporate thinking and its philosophy to our Space Technology curriculum. EXPECTED OUTPUT from this is: to use the fine-tuned coursework for the public via social media app using space science as a means to learn how to think effectively. Simultaneously, we can use the module to promote UKM's own brand of space science and technology that blends with thinking modes. Finally, a spin-off from this includes space science and technology to promote STEM education at the national level.

Key words: *Space Science; Thinking Modes; Industrial Revolution 4.0; Education 4.0 ; STEM Education.*

Introduction

The fourth industrial revolution is almost here, and Science, Technology, Engineering and Mathematics (STEM) education will be its most significant catalyst that will influence how we understand the natural world that can transpose to innovate new technology (and vice versa) (V. Narayanmurti, 2016). This has the potential to mitigate global problems, among others (e.g. climate change, declining energy and water sources, food security, high population density, poverty and sustainability) and brings out innovation-driven economies.

Generally, STEM is an approach to learning where students apply science, technology, engineering, and mathematics in a context that makes connections between various aspects of their lives. Many benefits can be associated with STEM education, i.e. providing opportunities for more higher-level thinking and problem-solving skills. Students learning STEM subjects are thought to think logically and utilize various tools independently to solve problems, innovate, and invent.

Competence in STEM subjects can impact careers, raise productivity, and competitiveness in multiple economic sectors and in latent economics sectors. A study by T.J. Moore et. al (2014) has suggested that STEM education should be contextualized using STEM into one teaching unit that is integrated between fundamental sciences and real-world problems. Thus, one can

conceptualize STEM educations as: 1) to stack together many separate disciplines (chemistry, biology, physics and mathematics) as one, assuming that their shared importance will promote advances in understanding the natural world and to innovate, and 2) as to emphasize the connection of logic and conceptual framework across different fields of STEM and to treat education holistically.

Content

Please include as many of the following sections as possible in your paper, as relevant.

1. Description of your innovation / product development / design / process

   To design a curriculum with space-related researchers, industries and educationist to design a pilot career-proof curriculum involving space science and thinking-based frameworks,

   For this, we would create a database listing all UKM and non-UKM space researchers, and industries and educationist inclined towards space (herein referred as experts). This database would serve as our go-to people, as we will interview them on what they think would be the best curriculum, together with their future outlook.

   Once we have this information, we shall design our new curriculum with the information provided and with related literature on modes of thinking. This would include cognitive biases, lateral thinking, etc. We shall present this CITRA ANGKASA course.

2. What is the context or background of the innovation / product development / design / process?

   The proposed curriculum merges relevant emerging fields namely Astronomy, Astrophysics and Astrobiology. We want to employ thinking frameworks from space science into a curriculum. Merging these fields has not been explored and manifested before. And by that this project, is — original.

3. Why are they important to education?

   While astronomy or astrophysics as a field are the most popular space science field, other emerging field that involves space industries such as Astrobiology, Human spaceflight, and even astrotourism are not coming to light. All of these require a unique framework of thinking.

4. Please write any advantages of your innovation / product development / design / process towards education and community

   - to design a curriculum with space-related researchers, industries and educationist to design a pilot career-proof curriculum involving space science and thinking-based frameworks,

   - to create a new module of space science and its related technology in the form of a digital platform, open to the public.

   - to prepare future-proof workforce

5. Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

Continues fine-tuning with a novel curriculum suggested thus far, will allow us to come up with a new module of space science and its related technology. We intend to build this in a digital platform that is ideally open to public. The reason for this is that: space science should be open to everyone. We will start this with a simple web-based prototype or wiki-based for budgetary reason. This would then be expended to other more engageable platform when new budgetary permits.

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'DRONEDUCATION': PROMOTING EXPERIENTIAL LEARNING WITHIN CYBERGOGY PARADIGM

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Highlights: With more jobs being taken over by digital technologies, the major concern of HEIs today is to find possible means on how to develop future-ready workforce. This study explores the use of drones to enhance university students' knowledge and its application within the context of IR 4.0 education. This course promotes meaningful and collaborative learning through experiential learning approach within cybergogy paradigm. We wish to highlight that in the effort to maintain the meaningful and collaborative aspect of the course amid the pandemic, borne opportunities for the students to learn first-hand from the experts and practitioners in the industry through a series of collaborative drone activities and forums typically held via the course official social platform, Facebook. This paper shows the importance of synergy between universities and industries to empower students' learning experience. Given uncertainties ahead, the findings will contribute to HEIs to prepare tomorrow's workforce to meet the IR4.0 challenges.

Key words: drone; curriculum 4.0, IR 4.0, cybergogy, 21st education

Introduction

IR 4.0 will change the future of employment with many current jobs no longer existing in the years to come. The flagship reports of World Economic Forum's Future of Jobs 2018 reported that "*a cluster of emerging roles will gain significantly in importance over the coming years, while another cluster of job profile is set to become increasingly redundant''*. The rapid development of IR4.0 has changed the world with various technology-based inventions and innovations.

To better prepare graduates for these rapidly changing industry needs, the HEIs' role is not only to produce graduates to fit in the current job markets and empower them to adapt to the future jobs that have not yet existed. In line with current reforms, most Higher Education Institutes (HEIs henceforth) in Malaysia have already restructured their curricula by integrating subjects that are significantly pertinent to the needs of the IR4.0 workplace for their students (Benavides et al., 2020; Ishak & Mansor, 2020; Karim, Adnan, Salim, Kamarudin, & Zaidi, 2020). This notion has been communicated through the IR 4.0 Education framework to ensure that Malaysian universities' programme is in line with the global and local changes that have taken place in the IR 4.0 era. This accentuates flexible education that incorporates collaboration with the industry to develop future graduates' 21st-century skills; critical thinking, problem-solving,

communication, collaboration, creativity, technological literacy, and digital skills which can also be incorporated within cybergogy paradigm.

Content

Description of your innovation / product development / design / process.

As abovementioned, the Drone for Aerial Photography - an elective curricular course - was initiated in nurturing, upskilling, and preparing talents and skills for IR 4.0. This initiative helps students develop their work-based needed skills to warrant them the future's high-paid and high-skilled jobs. In line with the IR 4.0 educational approach, this drone course is designed on a multidisciplinary orientation that emphasizes collaborative and hands-on experiences to prepare students for the workplace.

Drones (or unmanned aerial vehicles) are designed with aerodynamic forces instruments, including robotic arms or high-definition digital cameras, to improve and optimize industrial processes. Though they initially seem to be more of a niche hobby; extensive growth in the applications and technology developments make drones an important emerging technology to enhance operational efficiencies for many industries.

What is the context or background of the innovation / product development / design / process?

The course, within the cybergogy paradigm, persists toward promoting collaborative and meaningful learning amid pandemic Covid-19. Such learning experience is enhanced through blended approach to online learning. The students were given exposure to the complex and challenging drone industry scenario that required novel solutions. For that, students were taught six components of drone application in industry, ranging from:

  i.   theoretical (such as types of drones, fundamental uses of drones, and drone operation techniques), to

  ii. practical drone applications (such as drone application in the industry, professional drone-related careers, and drone entrepreneurship).

We wish to highlight that in the effort to maintain the meaningful and collaborative aspect of the course, opportunities were created for the students to learn first-hand from the experts and practitioners in the industry through a series of collaborative drone activities and forums typically held via the course official social platform, Facebook. During the session, the guest speakers shared their practical knowledge and real industry example on drone application and implementation. This facilitates the students to integrate theory and current best practices in the industry. By utilizing experiential learning approaches, nearly all students (96%) were relatively satisfied with the guest speakers' forum. This manifests that the students had enjoyed the real-world knowledge sharing session that enhanced their knowledge and learning experience.

Why are they important to education?

With the sophisticated design and wide range of drones' application, many educational practitioners have begun to integrate drone technology to enhance teaching and learning processes. For example, some educational practitioners have promoted drones as a platform to enhance teaching and learning processes (Norman, Nordin, Embi, Hafiz, & Ally, 2018). By using drones, Chou (2018) has established a comprehensive curriculum to investigate the impacts of using drones on the development of cognitive skills and sequencing skills

(Bermúdez, Casado, Fernández, Guijarro, & Olivas, 2019). The finding revealed a significant relationship between drone application and students' learning improvement (Nordin & Norman, 2018) in both skills.

In fact, with the growing importance of Science, Technology, Engineering and Mathematics (STEM) skills for the future, many educational practitioners have started using drones to engage their students in STEM Education.

Please write any advantages of your innovation / product development / design / process towards education and community.

Through this course, we instil digital knowledge based on students' interest, equipping them with the right digital skills, enriching digital experience, and transforming them to strive for jobs that have not existed. The teaching and learning process were based on the real drone-related business case studies with the guide from the industrial experts. This is to prepare them to make significant contributions to the industry immediately upon graduation.

In this course, the industries actively designed the curriculum, such as holding in-class workshops, participating in professional development activities, hiring interns, sponsoring capstone projects, and providing job placement.

Most importantly, the design of this course structure is proven to be fluid, flexible, and organic to cater to the needs of all students regardless of their discipline. This drone course encourages students from different profile to individually develop both the depth and breadth of skills and ability as part of academic achievement in the various drone-related knowledge.

Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

Before enrolment to the course, more than half of the respondents reported that they already have the literacy of the basic use of drones. Furthermore, more than two-thirds of them have sound knowledge of basic uses, types, applications, drone entrepreneurship and drone-related careers. It can be asserted that most of the students who participated in this course due to their interests, curiosity and career potential. Hence, we believe this course has the value to be branded and repackaged for an online distance learning module as ''droneducation'' is relevant to the masses regardless of age, disciplines and career profile.

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PREPARING FUTURE TALENT FOR IR4.0 IN HEIs: REFLECTION FROM THE FIRST STUDENT COHORT OF DRONE COURSE

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Highlights: This study presents the students' satisfaction, experience and expectation from the drone course as an exemplar of an IR4.0 related course. We used a structured online questionnaire, and the first students enroll on this course were the respondents. The findings showed that prior experiences, curiosity, personal interests, and career potential on the drone had developed students' motivation for enrolment. Student eagerness spurred for IR-related technology and futuristic curriculum. Five main challenges (course design, pedagogies, planning activities, teaching activities and evaluation) in developing the IR4.0-related curriculum were evaluated. This study provides a baseline for HEIs when designing IR4.0 related co-curricular courses.

Key words: IR 4.0, Education 4.0, Drones, Futuristic Curriculum, Digital Talent

Introduction

Content

1. Description of your innovation / product development / design / process.

   The Drone for Industrial Applications course (herein referred to as Drone Course) is offered to introduce an IR 4.0 future-ready curriculum. To meet IR 4.0 and future proof talent preparedness, the Drone Course is made up of three components comprise **Theoretical** such as types of drones, basic uses of drones, and drone operation techniques; **Practical drone** applications such as drone application in the industry, professional drone-related careers, and **drone entrepreneurship**; Exposure of drones in multidisciplinary fields and industrial setting.

2. What is the context or background of the innovation / product development / design / process?

   IR4.0 challenges Higher Education Institutions (HEIs) by providing a flexible curriculum, introducing different pedagogies, establishing a fluid and organic curriculum and employing the latest learning and teaching technologies to support teaching and learning activities. New modes of delivery for teaching and learning which operationalize digital solutions are embedded in this future proof curriculum.

3. Why are they important to education?

There is a huge concern on students' or youths' capabilities and readiness in facing IR 4.0, particularly the future employability. This concern is not a localized issue but a global one occurring in both developed and developing nations. A study by Succi and Canovi (2020) found that students are not well prepared for their employability and suggest that HEIs and industries need to collaborate to develop these essential skills to continuously adapt to the changing labour market.

4. Please write any advantages of your innovation / product development / design / process towards education and community.

At present, Industrial Revolution 4.0 (IR4.0) influences our lifestyle, social, and culture. There is no denying that IR-based technology has radically changed our lives. In turn, this will change future jobs and industry globally, calling for a shift in workforce demands (Bongomin et al., 2020; Hahn, 2020). Therefore, higher education institutions (HEIs) would require developing readily marketable talent to meet upcoming industry demand. Given that IR4.0 is revolutionizing traditional ways in the teaching and learning process (especially in the recent ongoing pandemic), there is an urgency for HEIs to nurture the right kind of talent, and to some extent, future proofing them. This involves empowering students with digital know-how and hybrid skills for jobs of the future.

5. Please add any commercial value in terms of marketability or profitability of your innovation / product development / design / process if any.

Drone technology course can be used as a pilot study to evaluate its effectiveness in facilitating the link between IR4.0 career-ready students, HEIs and industries. Industries may need data to strengthen their market values and it offers collaborative opportunities for these entities.

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E-PORTFOLIO (CREATIVECAREER.SPACE) AS AN EMPLOYMENT TOOL FOR STUDIO BASED LEARNERS

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Highlights: This project takes an in-depth look at the rationale behind the integration of studio-based learning e-Portfolio as an employment tool in higher education institution (HEI) namely as CreativeCareers.space. In order to achieve this project, the researchers developed an e-Portfolio that employers and academicians can view studio learner's assessment regarding the evaluation of their work, performance and progress. Therefore, this project could help recruiters to have an in-depth look at possible future candidate qualifications rather than just looking at education and experience. The research approach of the project is through prototype practice. Various literature reviews have been studied in order to carry out the goal of this product. From this, the result of studies mostly showed a positive attitude towards the use of e-Portfolio as an employment tool in the studio-based field.

Key words: employment tool, e-Portfolio, studio-based learning (SBL), studio learners

Introduction

According to (Hills & Randle, 2010), e-Portfolio is the best exhibitor of lifelong learning and professional development in the career journey of any information professional. Previous research in (Webb, 2011) has shown that e-Portfolio use a collection of electronic evidence assembled and managed by a user, usually on the web, and such electronic evidence may include input text, electronic files, images, multimedia, blog entries, and hyperlinks.

In this research, the use of the e-Portfolio offers a new way of recording a graduate's achievements, to reflect and learn, to store information, to plan career paths and to build network as there is a large body of research exists surrounding the importance of maintaining a positive online presence in an increasingly demanding job market. Based on a study by (Leahy & Filiatrault, 2017), (Schawbel, 2011) predicted that within 10 years, resumes will be replaced by various online communication sources, such as the E-Portfolio. Therefore, a foremost strength of e-Portfolio is that it is a job applicant performance tool which includes extending one's curriculum vitae (CV) and provides future employers with a comprehensive portrait of one's academic training, achievements, and future career goals.

Besides that, e-Portfolio is not only used for keeping student's coursework and achievements but also to keep track of student's learning growth and to prepare for future career development (Norazman, 2014). As (Kennelly & Reardon, 2014) stated, an online career portfolio or e-Portfolios is an online tool which allows students to identify learning experiences leading to the development of desired skills, a collection point for listing students' accomplishments and skills, and a potential marketing tool for students seeking graduate school or employment. This is supported by (Hills & Randle, 2010) who stated that e-Portfolio not only

allows the user to record past experiences but also put them in context with current and planned requirements. This is agreed by (Gillian Hallam, 2008), who stated that an e-Portfolio creates a structured environment that supports recording and reporting of professional activities for individuals, employers and professional associations.

Statement of the Problem

As the employer demand is a competitive field for job applicants, it is a time -consuming process for recruiters to find the most suitable candidates for the opening position. Therefore, strong personal branding portfolio is a way to be different in the labour market and creates an advantage for job applicants as it allows them to stand out among other applicants who are still using papers in their job application.

Graduates need to create creative strategies that are a vital part of obtaining and holding the high -quality talent to add to the employer. Currently, the graduates are becoming more aggressive and aptitude sets keep on growing more diverse. Therefore, an E-Portfolio could help recruiters to have an in-depth look at possible future candidate qualifications rather than just looking at education and experience.

E-Portfolio as an Employment Tool

Therefore, the researcher aspires to explore how the development of an e-Portfolio combined with e-Portfolio pedagogies, impacted the interview performance of undergraduate students as they prepare to enter the job market in order to support e-Portfolio as a job applicant performance tool. Thus, to cater for this literature, (Hills & Randle, 2010) mentioned that e-Portfolio will support learning and career needs of an individual for their entire life, from preschool to retirement.

Thus, this project outlines the development of an e-Portfolio joined with heutagogy learning which could impact the performance of studio-based learning undergraduates in job interviews as they prepare themselves for the demanding job market among studio-based learners. This project takes an in-depth look at the rationale behind the integration of studio-based learning e-Portfolio as an employment tool in higher education institution (HEI) namely as CreativeCareers.space. Therefore, as the researcher has background knowledge and skills in studio -based learning, the researcher aspires to implement the e-Portfolio system with primary objectives to identify the studio-based practise learners' needs of e-Portfolio in the demand of the workforce. This research will touch on the functionality of e-Portfolio as a teaching and learning tool for studio -based practice learner from a fresh graduate and a new user point of view and will discuss how e-Portfolio can be used and adapted in search of employment especially in job interviews, depending on the individual needs of the user.
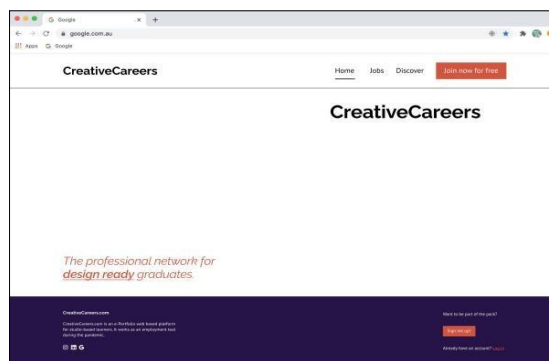

Figure 1: Visual layout home page of e-Portfolio (CreativeCareer.space)

Electronic portfolio or e-Portfolio is a dynamic document that can be viewed from any Internet-enabled computer or stored on other digital storage devices. An e-Portfolio website address can easily be sent to multiple prospective audiences, both locally and around the world.

As a studio-based learner and educator, the researcher develops the idea of graduates building a professional online reputation by developing an e-Portfolio. If e-Portfolio is to be introduced to students as a learning tool in their secondary education before continuing to tertiary education, then it would be safe to say that those students would have had use e-Portfolio throughout their formal education. However, due to the novelty of e-Portfolio, only a few researches have been done to understand the level of readiness and awareness of learners or studio-based practice learners, in particular for this research, of e-Portfolio as an employment tool.

Graduates who had already use e-Portfolio as a learning tool and establish their own e-Portfolio during their secondary and tertiary education will benefit the most from this learning tool for their future employment or for their own personal use as they would not face the problem of losing records or collection of their previous works and accomplishments. In the case of a graduate applying for a job, detailed information about the student is not always easily added to a pen and paper résumé, but may be included effectively in an e-Portfolio. For example, a student can post actual examples of their papers, artw ork, engineering designs, budgets, reports, architectural drawings, advertising brochures, and PowerPoint presentations to demonstrate their skills (Zhang, Olfman, & Rachtham, 2007). This will be a natural environment for these students and they will be co mfortable in the e-Portfolio environment. Thus, this is what the researcher aspires to witness as e-Portfolio could be one of the answers to unemployment around the globe and particularly in Malaysia as graduates could showcase their skills and qualificati ons through the use of e- Portfolio.

As e-Portfolio becomes a more common teaching and learning tool in Higher Education Institution assessment and evaluation practices, it is only natural to promote e -Portfolio as an employment tool for undergraduates transitioning into job seekers. Though the widespread use of social media has brought jobseekers online, they failed to realise that not only them who are looking for employment online, employers too are seeking candidates online. (Werschay, 2012) cited that almost eighty percent of employers look for job candidates online while only seven percent of jobseekers thinks their online data affects their employment search. From this, we can conclude that e-Portfolio could be a useful employment tool for graduates seeking for employment.

Significance of Studio-Based Learning e-Portfolio

The significance of this research contributes to the reasoning of the integration of studio -based learning e-Portfolio as an employment tool for studio-based learners, educators, and employers. Therefore, the expected contributions from this research are as follows:

a) E-Portfolio for Employers
   One of the focuses of this research is to determine the employers' view of using e-Portfolio for hiring purpose. E- Portfolio allows potential employers to view the applicants' skills and achievements in order to come to a decision making in the hiring process. Employers will be able to consider an applicant based on the applicant's skills and achievements rather than their personal background.

b) E-Portfolio for Graduates
   This research intends to improve the assessment criteria for studio design project to

develop e-Portfolio as a teaching and learning tool in studios. The current teaching method that is being used in the studio will be enhanced through a new guideline to support student learning in studio-based practice and to facilitate the continuous assessment format. The studio-based learners might not fully understand the significance of e-Portfolio in the beginning of their higher education learning, but they will surely learn the importance of it as they build their work collection throughout their learning process.

c) E-Portfolio for Educators

For educators, the e-Portfolio promises a new environment with tools to demonstrate and assess students learning and thus helps to map teaching and learning outcomes that are in line with each institution's established principles of learning. It also facilitates educators to help graduates produce works are in line with the assessment criteria in order to produce a better outcome of their works.

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ONLINE TEST PROCTORING AND MONITORING FOR REMOTE ASSESSMENT

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Highlights: The coronavirus disease 2019 (COVID-19) Pandemic had changed the way teaching and assessment are conducted. This paper introduces a remote proctoring approach for UiTM online assessment. This remote proctoring enables students to take the test in a remote location while maintaining the test's integrity. This approach confirms a student's identity and monitors him/her through a series of images taken during the assessment using the student's web camera. The images captured during a remote proctored test helps to flag any suspicious student identity.

Key words: *test proctoring, test monitoring, online assessment, online test, remote assessment.*

Introduction

Many universities explored the option of remote assessment. This also has led to an interest in different approaches to remote assessment and how to enhance student authentication in the online remote test. During classroom assessment, monitoring students were easier because the instructor can see their students face-to-face and reduce the potential for cheating.

However, the remote assessment has placed the instructors and students far apart and making it difficult for student authentication in the online test. One potential solution proposed to the university management was the remotely proctored test. Remote proctoring is a process for authenticating, authorizing, and controlling the online test process. It is a technology that allows the university to enable remote assessment.

The remote test proctoring can be conduction through the internet via the web camera of the students. The few types of test proctoring are video proctoring, image proctoring, auto proctoring, and identity verification. The biggest challenge in remote learning or assessment was dealing with the student's internet connectivity. Those students taking the remote test from villages have average or low internet connectivity.

Thus, for this initiative image-based test proctoring was suitable because some student's internet connectivity was not good. This proctoring will verify remote test attempts by student's multiple times randomly. The system would capture pictures of the students at specific time intervals.

Later the instructor will validate those images to ensure that an actual student has conducted an online exam. The image-based test proctoring is cost-effective and requires lower bandwidth as compared to video streaming quality. This image-proctored test is targeted to be used for UiTM remote assessment by close to 170,000 students.

Problem

The COVID-19 pandemic has necessitated significant changes in higher institutional education. One of the biggest challenges concerned in student remote learning is their assessment. Due to the social distancing regulations, the student assessments need to be conducted remotely. But most of the remote assessments that are conducted are not proctored. Thus, it is very difficult to prevent cheating and fairness in assessment (Lee et al., 2020).

Solution

The majority of students at UiTM take their remote assessments using Learning Management System (LMS) named UFUTURE. To minimize the cheating in the online test during the remote assessment, this study implements before and during strategies in the LMS. The before strategy was asking the students to submit the Student Pledge of Academic Integrity in the LMS. While the during strategy was implemented using 3 ways: (1) random image recording, (2) online test monitoring dashboard, and (3) random question sequencing function in the online assessment module.

The students will be informed to make sure their face is visible to the webcam using a short message before starting their online test. The system would capture 4 pictures of the students at specific time intervals, one when the test starts, and one when ends or submission, and two randomly during questions attempted. The course instructor can compare the captured image with the image inside LMS to identify if the student was cheating. Besides that, the course instructor has also given a live student online test monitoring dashboard to check for any abnormality in the way students answering the online test questions.

Result

The online proctored test was conducted among 44 students. For 86.4% (n=38), the captured image and stored image are similar. The remaining 13.6% (n=6) were unable to use the webcam due to not working or not available. They were monitored using an online test monitoring board. Thus, these strategies can control cheating during the online test.

Conclusion

The universities need to have secure test proctoring to maintain integrity and fairness in remote assessment. Generally, student cheating in remote assessment can be overcome by designing the proctored or non-proctored online test. Although the implementation of proctoring can control student cheating in online assessment, it is also important to look into the quality of questions for remote assessment. Remote assessment questions need to measure high-level skills like creative thinking, critical thinking, problem-solving, etc. (Abdul Rahim, 2020; Senel & Senel, 2021). The questions designed with high-level thinking may not require proctoring at all. Thus, this can be an alternative method to reduce cheating and maintaining the integrity of the assessment regardless of proctoring structure. Thus, the future work will explore the best practices for remote assessment that will describe the structure of online tests through UFUTURE platform.

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ONLINE CLASS SCHEDULING AND ATTENDANCE REPORTING

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Highlights: The purpose of this project is to develop a tool for the instructors to schedule their online classes and monitor their students' attendance using an analytic report. One challenge faced by the instructors of an online course is monitoring their students according to their class schedule. The instructors also use various tools to enable the online class making it difficult for the students to receive the online class link and the recorded lecture sessions. Thus, this project provides a module for online class scheduling, student attendance taking, and monitoring student's attendance for their online courses.

Keywords: online class schedule, student attendance, attendance report, analytic report.

Introduction

The outbreak of the Coronavirus disease 2019 (COVID-19) pandemic has greatly affected the way teaching instructions were delivered. The course instructors had to shift and convert their face-to-face teaching instructions to fully online. Fully online learning is divided into two methods, synchronous and asynchronous online learning. Synchronous online learning happens in real-time and often has a set or confirmed class schedule. This method is commonly supported by the use of media such as video conferencing tools (Zoom, Webex, Google Meet, etc) and chat tools (WhatsApp, Telegram, etc). While asynchronous online learning happens in a non-real-time environment and is facilitated by media such as discussion boards when the instructors and the students cannot be online at the same time. Thus, the students can access their learning materials flexibly according to their schedules.

The asynchronous learning method has been used for course learning even before the pandemic to support classroom learning or as blended learning. But the synchronous learning happens in the classroom in real-time before a pandemic. During the pandemic, the course instructor and student have to use a specific virtual platform at a scheduled time for synchronous online learning. In this session, the instructors take attendance similar to traditional classroom attendance. The biggest challenge faced by the instructors is managing the online class schedules and monitoring student online class attendance.

Content

An important aspect of an online class is monitoring student attendance. Research shows that monitoring student's monitoring data is an important component for high-quality education (Mazza et al., 2012). The attendance monitoring data can help to reveal who has been present in the online course. The student's attendance rate for daily, monthly, and overall semester helps in better understanding whether the course provides a good synchronous online learning environment (live discussion, collaborative online learning activities, etc).

This project presents online class scheduling and attendance monitoring reporting tool in Learning Management System named UFUTURE. These reports were aimed to manage online class schedules and students' online class attendance monitoring. The student online class attendance monitoring is based on the schedules created in the system. The attendance monitoring report generated in the system will provide a better understanding of student's participation in the online class and improving synchronous online learning. It was found out that student's participation in online courses is influenced by their learning motivation (Kaya, 2021). Thus, it is of utmost importance to stimulate and maintain students' online learning motivation. This attendance report generated will provide insight into students' motivation level to attend online classes. If poor student participation is identified, the instructors can use their traits and skills to improve their teaching method in synchronous online learning (Qunfei et al., 2020)

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Highlights: Inovasi ini tercetus daripada rungutan pelajar tentang kesukaran kursus DWI 41903 iaitu Dakwah dan Isu-isu Kontemporari bagi pelajar-pelajar tahun akhir Sarjana Muda Pengajian Islam (Dakwah). Secara umum, kursus ini bertujuan membantu pelajar mendapat pengetahuan mengenai isu-isu kontemporari, berfikir secara kritis dalam penyelesaian bermasalah, dan berkemahiran kolaboratif. Oleh itu, inovasi yang dinamakan "PERSPEKTIF DAKWAH" bertujuan memberi panduan kepada pelajar agar dapat menjayakan kursus ini dengan menstrukturkan cara mereka berfikir, memproses pengetahuan dan mencari cadangan penyelesaian bagi semua isu yang dibahaskan. Inovasi ini terdiri faripada 7 langkah iaitu BINA MAKNA, BINA ILMU, BINA HUJAH, BINA FAKTA, BINA WACANA, BINA PERSPEKTIF DAN BINA SOLUSI.

Key words: *Perspektif Dakwah, Isu-Isu Kontemporari, 7 Langkah*

ABSTRAK:

ABSTRAK

Kursus-kursus yang berciri *problem-based learning* yang menuntut pemahaman konsep dan huraian terhadap sesuatu gambaran, seterusnya mencari 'penyelesaian' kepada masalah, seringkali memberi cabaran kepada para pelajar. Ia turut memberi cabaran kepada pensyarah kursus berkenaan untuk mencari formula terbaik melaksanakan kursus yang berciri demikian agar dapat memenuhi tuntutan outcome-based education (OBE) yang memberi tumpuan kepada hasil pembelajaran kursus. Berdasarkan analisis terhadap kandungan kursus, pernyataan hasil pembelajaran, aktiviti-aktiviti yang dibuat sepanjang kursus berlangsung, pentaksiran yang dijalankan serta penilaian juga maklum balas tidak formal yang diberikan oleh pelajar yang telah mengikuti kursus, satu inovasi telah dihasilkan yang diberi nama **'PERSPEKTIF DAKWAH'**.

Content

1. Inovasi ini dinamakan PERSPEKTIF DAKWAH yang terdiri daripada 7 langkah untuk menghasilkan kejayaan pelajar beroleh pengalaman yang Berjaya melaksanakan semua tugasan.
2. Inovasi ini dihasilkan oleh menyelesaikan masalah kesukaran kursus ini dalam kalangan pelajar hingga menjadikan kursus ini paling menarik.
3. Dari sudut kepentingan, inovasi ini penting dalam menghasilkan graduan yang autonomous learner yang boleh belajar secara independent.
4. Berdasarkan refleksi dan maklum balas pelajar, inovasi ini telah memberi impak dari sudut kefahaman dan penghayatan, serta memberi kemahiran kepada pelajar untuk mengupas apa jua isu di hadapan mereka dan mampu mencari cadangan penyelesaian.
5. Inovasi ini dapat mengasilkan laman sesawang yang berkaitan dan dalam proses pembinaan modul untuk kegunaan UniSZA dan UA yang lain.

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References

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POTTY TRAINING KIT

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Highlights:

Key words: Potty training, toilet training kit, children, skills.

Introduction

Toilet training is defined as mastering the skills needed for independent urination and defecation consistent with social customs. Toilet training is one of the most challenging developmental stages of early childhood and one that all children must complete successfully to comply with the norms of our society and to gain autonomy and self- esteem. Toilet training a child with special needs can be more challenging and can result in long-term consequences if inadequately addressed. Even for normal child, parents often have difficulties to toilet train their child due to lack of skills and knowledge. According to Van Aggelpoel *et al.* (2021), in 1940 people began toilet training at a mean age of 18 months, whereas nowadays the mean age has increased to 21-36 months. In the 1950s 97% of children had completed toilet training by the age of 36 months. More recent data show that 40-60% of children are toilet trained by 36 months. In recent years, the age at which parents start and finish toilet training their children has increased (van Nunen *et al.* 2015). Too many children are toilet trained after the minimum school age of 30 months. Most parents are not aware of the possible negative consequences this can entail. Mothers with a paid occupation think more often that children should be toilet trained before the age of 30 months, and the higher the mother's educational level, the more likely she will send her child to school toilet trained. More of single parents think that children who are not yet toilet trained should be allowed to go to school and more often send they're not fully toilet-trained children to school. One of the causes for the delay in toilet training among children is the use of disposable absorbent diapers.

Also, today many parents work outside, resulting in less time that can be spent on the toilet training of their children. Poor toileting skills can cause physical discomfort and negatively impact personal hygiene, self-confidence, social competence and acceptance, thereby resulting in a dependence on caregivers for help. A later age for toilet training can also cause stress, frustration and tension between the parents and the child (van Nunen *et al.* 2015). There is still a lack of knowledge about how children really achieve bladder control. In many non-Western countries and in developing countries, by tradition or when diapers are not available, children seem to achieve bladder control in early infancy (Duang *et al.,* 2010). Children are generally considered fully toilet trained when daytime and nighttime bladder and bowel control are established and the independent task of toileting is achieved (Axelrod &

Deegan, 2019).

Despite the difficulties of parents with normal children to toilet train their children, children with autism spectrum disorder (ASD) are more likely to have higher rates of urinary incontinence than children without disabilities which leads to difficulties to toilet train them (Niemczyk et al. 2018; von Gontard 2013). children with ASD may experience barriers to toilet training, thus long-term incontinence, due to communication, language, motivation, and rigidity of routines. Parents of children with ASD may be discouraged to begin toilet training if their child does not demonstrate skills considered readiness indicators such as remaining dry, completing steps associated with toileting and communicating about toileting. Additionally, attention that may otherwise be spent on toileting, may be allocated to more pressing concerns such as communication and challenging behavior (Hayes and Watson 2013). A lack of emphasis on toilet training in the early years may pose challenges for individuals with ASD and their families later on. Thus, we have designed a potty training kit complete with books, flash card, and mobile augmented reality (MAR) application to help equipped the parents with skills needed to start toilet train their children.

Description of the Product

Potty Training kit is a set of training kit to help parents, caregivers and teachers to potty train children and enable them to be independent from the use of diapers. Potty training kit consists of several items which is potty training book (Oops Mama Saya Mahu ke Tandas), Flash Card Potty Training, Analysis Activity Card (2 cards) and Toilet Training schedule card. Figure 1 shows the full set of Potty Training kit.

Figure 1: Potty Training kit

This Potty Training kit integrates the use of augmented reality technology with the kit which allows the users to scan the provided illustration and watch the video included on the training kit. The video can be accessed through the installation of the Potty Training Apps which can be downloaded from Play Store (for Android users). The video shows steps to teach the children skills needed before they can start toilet train the children, as well as toilet training animation as a source of social story approach. Figure 2 shows the interface of the Potty Training Apps.

Figure 2: Interface of Potty Training Apps

According to MacLay *et al.* (2015), the use of video to teach the necessary skills for toilet training was effective in teaching a sequence of behaviors necessary for successful and independent toileting (e.g., walking to the toilet, undressing, sitting on the toilet, dressing, and flushing).

Advantages of the Product

Video modeling is thought to be particularly suited to children with autism (Delano 2007) and to have several advantages over, for example in vivo modeling. Firstly, video modeling takes advantage of their relative strength in visual processing (see e.g., Bellini and Akullian 2007) and common interest in watching videos, increasing the likelihood of the child attending to the modeled behavior. Secondly, the amount of irrelevant stimuli in the environment can be controlled through the use of video editing thereby compensating for possible over selectivity. Additionally, video modeling is considered cost effective as videos can be used repeatedly without requiring the continued physical presence of the person modeling the behavior. By using video in this product, information can be easily relayed to the users and it can help users to fully understand the information that they wanted to learn or master.

With both Potty Training Book and Augmented Reality Mobile Apps that allow parents to scan and watch the video tutorial on how to conduct activities required for their child before starting the toilet training practices, it enhances the users understanding and skills to help their children in a more effective way. Other than that, the use of offline mobile application allows users to use this everywhere and anytime without having to worry about internet connection. Each video shows a variety of activities for each skills. Parents can easily imitate the activities provided in the video to their children.

The use of flash card also help parents in terms of providing materials for visual cue and social story when training their children. Flashcard learning for children is quite popular as a playful means to introduce children to new words, images or concepts. The benefits of flashcards is that they make it easy to maximize the benefits of repetition and to improve kids' important (if debated) memorization skills. Thus help them to memorize what they need to do if they need to use the toilet.

Commercial Value of the Product

Potty Training kit has been launched into the market on 13 March 2021 through various platforms such as facebook, shopee and Lazada. Up until today, there are a total of 25 Potty Training kit has been sold to consumer. A total sale of RM 2,203.52 has been received from the sale of 25 Potty Training kit. Apart from that, the Potty Training book also has been registered under Intellectual Property Corporation of Malaysia. Figure 3 shows the Intellectual Property for the book.

Figure 3: Intellectual Property for Potty Training Book

This product focuses on parents with small children at the age appropriate for toilet training. The marketability of this product depends on the number of small children which is directly proportional to the rate of birth of children. However, the current birth rate for Malaysia in 2021 is 16.258 births per 1000 people, which reflects the potential customers for this product. Figure 4 shows the statistics for live births for year 2020.
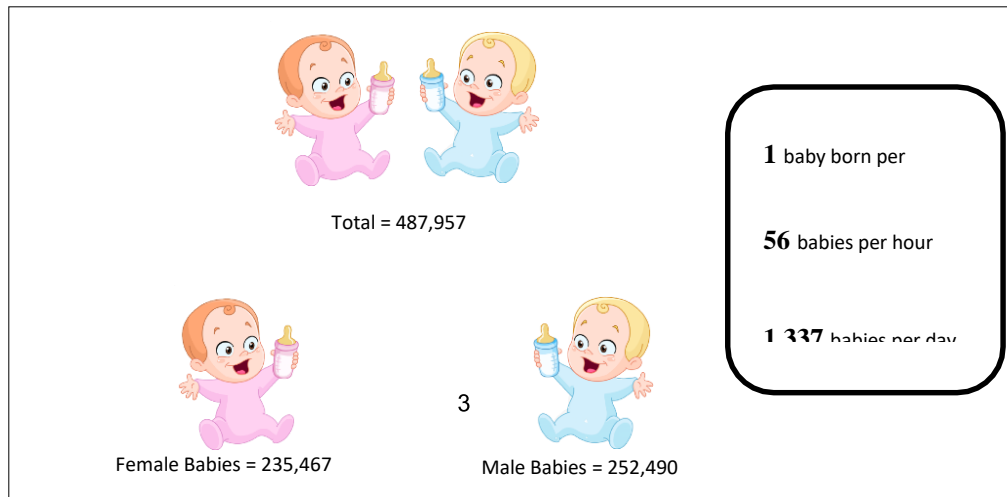
Figure 4: Statistics for live births on 2020

Other than that, Traditional methods of learning as we know it are becoming a thing of the past. They are becoming increasingly digitized, and being driven by technology innovations. In fact, the so-called EdTech, the education technology industry, is expected to reach $680.1 billion by 2027, growing at an annual rate of 17.9%. Among the most significant trends in EdTech, augmented reality rightfully takes a leading position. With the value of AR in Educational Technology predicted to surpass $5.3 billion by 2023, a pool of opportunities for learning materials providers is increasingly available thus provides a profitable approach for them. Figure 5 shows the statistics for the use of augmented reality technology in market.

Figure 5: Statistics for the use of augmented reality in market

According to the statistics, there will be around 810 million mobile augmented reality users by the year 2021 which increase the marketability of this technology implementation for products in the market. This means, more people will have access to use augmented reality technology using their phones and more applications will be available for users to use. Thus strengthen the facts that it is wise to use of augmented reality technology in this product.

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USING SATELLITE IMAGERY AS NAVIGATION TOOLS IN VIRTUAL SERIAL VISION (VSV) TO SUPPORT URBAN VISUALISATION AND DESIGN

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Highlights: This study highlighted how the Virtual Serial Vision (VSV) project had been applied in a pedagogical exercise in the Urban Planning Theory. This paper aims to enhance the student's learning experience by integrating virtual navigation into serial vision using satellite imagery. The VSV project has been developed based on the five stages in Design Thinking Theory. Although the VSV project was developed for the students, the application is also applicable and beneficial for the professional practitioner to support urban visualisation and design.

Introduction

Recently, the teaching and learning method of the Urban Planning Theory course has changed from face to face to online learning. Hence, a conventional practice used in this course, especially for Serial Vision, is inefficient and needs to be upgraded. This paper urges for an integration of virtual navigation developed from the work of Gordon Cullen. Therefore, this paper aims to enhance the student's learning experience by integrating virtual navigation into serial vision using satellite imagery.

Background of the Virtual Serial Vision project
For the past several years, the delivery of serial vision is mainly using traditional methods based on 'The Concise Townscape' (Cullen, 1971). He presented elements of townscape as an 'Environment Game' through the concerning optic (Serial Vision), concerning place (Here and There) and concerning content (This and That). This study explores the connection between serial vision and virtual navigation, leading to better urban visualisation and design. In the Sheffield Urban Contextual Databank (SUCod) project, Peng, Chang, Blundell and Lawson (2002) and Peng (2003) developed a Web-based virtual city platform to produce a new kind of virtual city application that allows end-users to reconstruct urban contexts online. Asanowicz (2011) integrates digital technology with urban composition teaching in serial vision.

Importance of the Virtual Serial Vision project towards Urban Visualisation and Design
The VSV project was helpful for the student to empower critical thinking and decision making because it encourages the advancement of self-navigation that gives the autonomy for the students to construct their serial vision route. Most importantly, the VSV project reveals the prospects of virtual navigation supported urban analysis and design in urban landscape studio through online sources. The virtual navigation further emphasizes that the VSV project aims to align with the global world trend and accommodate the Fourth Industrial Revolution in education. These fundamental abilities will give students the lift required to succeed in universities and future professions. The VSV project may benefit the educational community members as well in terms of teaching methods and approaches.

Advantages of the Virtual Serial Vision project towards education and community
The VSV project allows students to be self-directed and flexible to work within their timeline and location without the need to travel. Furthermore, the VSV project had improved students' knowledge, ability to foster spatial thinking and develop critical technology and thinking skills through Satellite Imagery. Solem and Gersmehl (2005) have demonstrated that online resources have helped improve student comprehension of significant concepts and skills while helping students gain confidence in their knowledge of geographical issues. Monet and Greene (2012) also support the use of Google Earth and Satellite Imagery to foster place-based teaching due to the students' difficulties in interpreting the geologic processes that shape the local and regional natural environment characteristics.

The design process of the Virtual Serial Vision project using Design Thinking Theory
The design process of innovation in virtual serial vision encompasses five stages of Design Thinking Theory: Empathise, Define, Ideate, Prototype and Test. The first stage of the Design Thinking process was to understand the students' perspective by identifying and addressing the problem. For example, not all the group members live in the same case study compound. Hence,

some cannot participate in going to the site and cannot produce manual sketches of serial vision. The second stage was to define the problem statement clearly. The brainstorming session was conducted in the meeting of the project brief attended by lecturers in the Landscape Architecture Department. Brainstorming members brought different approaches to comprehend problems and yet provide various ideas of consideration. Next, the ideation stage was composed of two steps which were idea generation and concept development. Researchers used the KJ method for idea generation. The output from the KJ method was used as a starting point for the concept development step involved the clustering, combining, and selecting of the ideas generated and then further developed the selected ones. During the prototype phase, 51 students from 10 groups were engaged in the VSV project using the Satellite Imagery as a navigation tool. The implementation of the VSV project will be upgraded based on the current advancement of technology and the users' feedback throughout the testing phase. In the testing phase, the VSV project was built based on three pillars: assumptions using a storyboard as a planning tool, prototyping where the critique session happens with the lecturer to control the potential impact of the experiment, and running the experiments through recorded video.

Commercial value of the Virtual Serial Vision project
The VSV project provides lecturers, students, and professional practitioners with access to technologies and opportunities to reflect on their practice. The virtual navigation can be used as an enhancement tool in the site visit, survey, inventory, and analysis.

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ENGAGING CHILDREN WITH EDUCATIONAL CONTENT VIA GAMIFICATION

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Highlights: The COVID-19 has resulted in schools shut all across the world. Globally, over 1.2 billion children are out of the classroom. As a result, education has changed dramatically, with the distinctive rise of e- learning, whereby teaching is undertaken remotely and on digital platforms. Educators now have access to a wide variety of tools to boost student engagement and help children learn. In recent years, numerous studies have shown that direct instruction, such as through the use of lecture and notetaking, is not effective, especially when compared to newer methods and strategies. Gamification concepts incorporate design elements of games to boost student engagement. In this project, an e-learning game based on the classic board game, "Snakes and Ladders Interactive Quiz" has been developed with the aim to engage children with educational content via gamification. The game known originally as Moksha Patam, an ancient Indian board game, is a popular board game played by children worldwide.

Key words: Gamification, Interactive Learning, Snakes and Ladders

Introduction

Any learning experience, whether instructor-led or digital, cannot be completed without a quiz. While all educators and course creators know and agree about the importance of good quizzes, the variety of the interactive quiz platform is quite limited. In the race for more interactive tool, the software community has come up with a class of platform that help educators and course creator to author and compile questions into interactive learning quizzes, and share them easily with global audience. "Snakes and Ladders Interactive Quiz", an interactive web based quizzing platform allows educators and course creators to quickly create learning quizzes for any learning module and level of students. To create an interactive and engaging quizzing session, Snakes and Ladders game concept has been used as part of the answering method in "Snakes and Ladders Interactive Quiz".

Description

One of the challenge in developing digital learning quiz platform is to verify the answer given by the students, especially if the question is an open ended question. There are four types of quiz questions that are suitable for digital quiz platform and able to measure whether the students are actually learning. The types of learning quiz question describes in Table 1.

Table 1: Types of learning quiz questions that are suitable
for digital quiz platform

Question Type	Description
Multiple Choice	Multiple choice questions are among the most effective ways to test learners on the content of online quizzes. They present several possible answers to a question, only one of which is right and the others being "distractors" meant to draw attention away from the real answer.
True or False	One of the easiest ways to frame questions is in true or false format. This type of question measures only low level of learning - remembering and understanding.
Fill in the Blank	Also called completion questions, no-hint fill-in-the-blank questions require that learners actually know the correct answer. This provides an excellent means for measuring specific knowledge, as it can reduce guessing by the students, and force them to supply the answer.
Matching	Matching, like fill-in-the-blank questions with hints, gives learners a little more to go on, and is therefore a good approach if more time given to students to absorb material.

To add interactivity element in answering the quizzes, traditional Snakes and Ladders games concept is adapted in "Snakes and Ladders Interactive Quiz". There are six level of question based on six Bloom's Taxonomy level. The 6 levels of Bloom's Taxonomy are Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. Before starting the game, the question level need to be chosen first . Once selected, each student starts with a token on the starting grid. Students take turns rolling a single die to move their token by the number of grids indicated by the dice roll. Tokens follow a fixed route marked on the game board which usually follows a track from the bottom to the top of the playing area, passing once through every grid. If on completion of a move, a student's token lands on the lower-numbered end of a "ladder" and higher-numbered square of a "snake, they need to answer a quiz question. If the answer is correct, the player moves the token up to the ladder's higher-numbered grid. If the answer is wrong, the token must be moved down to the snake's lower-numbered grid. Figure 1 describes overall work flow of the specific activities for each user role of Snakes and Ladders Interactive Quiz.

Figure 1: Workflow Diagram for Snakes and Ladders
Interactive Quiz
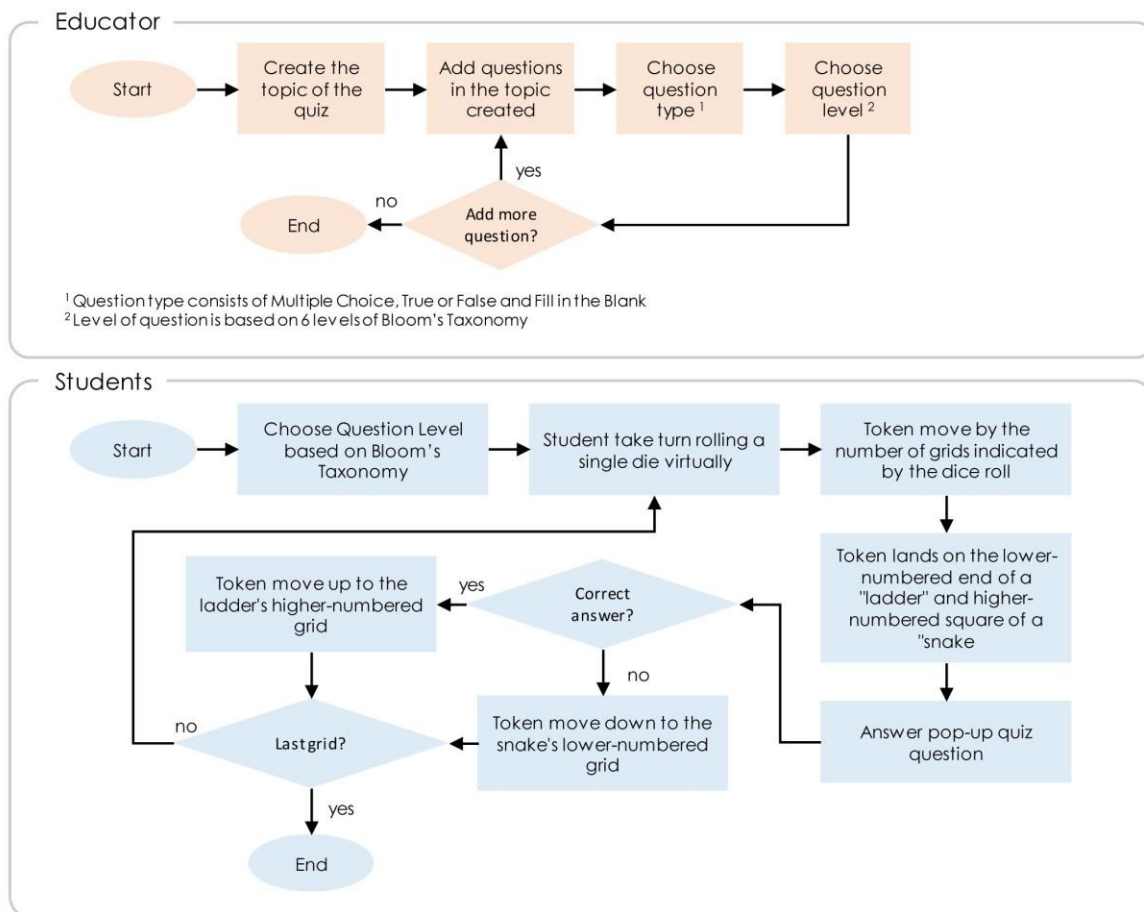
Conclusion

There are a lot of online quizzing platform available on the Internet, but not many applying interactivity elements during the quizzing session. Snakes and Ladders Quiz imitating the traditional Snakes and Ladders concept, where the student need to toss the

dice virtually, follow the original rules of the game and answer the random quiz question appeared on the screen based Bloom's Taxonomy level. While the current platform is more focusing on the interactivity to support active learning, the future works of this project will include students' learning log to support performance prediction.

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ACAPRO: ACADEMICIAN PROFILE AND TALENT MANAGEMENT SYSTEM

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Highlights: Pengurusan bakat dan laluan kerjaya staf akademik merupakan agenda utama dalam menyediakan bakat kepimpinan di Universiti Awam (UA). Justeru itu, dalam usaha mengenalpasti dan menguruskan potensi bakat kepimpinan, rangka kerja berasaskan analitik data raya perlu dibangunkan. UA sebagai sebuah organisasi yang memiliki sejumlah data yang sangat besar dan menyeluruh perlu mengupayakan data ini sebagai satu sumber yang memberikan pengetahuan dan dapat membantu dalam proses pembuatan keputusan. Pengurusan bakat secara analitik dapat membantu organisasi meramal dan mengkelaskan bakat ahli akademik dengan lebih tersusun. Pengkelasan ini memudahkan pengurusan UA untuk merekabentuk latihan/bengkel yang lebih berfokus dan bersesuaian mengikut keperluan.

Key words: *Pengurusan Bakat, Analitik Data Raya, Model Peramalan, Latihan Berasaskan Kecekapan*

Pengenalan

Pengurusan bakat merupakan antara keperluan penting sesebuah organisasi dalam usaha memastikan kelangsungan kepimpinan di dalam organisasi. Bakat kepimpinan di kalangan ahli akademik merupakan antara perkara penting yang di nyatakan pada Pelan Pembangunan Pendidikan Malaysia (2013-2025). Antara inisiatif yang diberikan perhatian adalah menambah baik pengurusan bakat dan laluan kerjaya. Justeru itu, dalam usaha mengenalpasti dan menguruskan potensi bakat kepimpinan di kalangan ahli akademik satu rangka kerja berasaskan analitik data raya perlu dibangunkan. Universiti Awam (UA) sebagai sebuah organisasi yang memiliki sejumlah data yang sangat besar dan menyeluruh perlu mengupayakan data ini sebagai satu sumber yang memberikan pengetahuan dan dapat membantu dalam proses pembuatan keputusan. Pengurusan bakat secara analitik dapat membantu organisasi meramal dan mengkelaskan bakat ahli akademik dengan lebih tersusun dan objektif. Pengkelasan ini memudahkan pengurusan UA untuk merekabentuk latihan dan bengkel yang lebih berfokus dan bersesuaian mengikut keperluan ahli akademik. Ini dapat membantu ahli akademik memahami potensi diri berdasarkan data dan maklumat yang diperolehi manakala pihak pengurusan UA pula akan dapat mengenalpasti bakat kepimpinan di kalangan ahli akademik.

Penerangan Produk Inovasi

Rajah 1 merupakan rangka kerja pengurusan bakat kepimpinan ahli akademik yang telah dibangunkan. Model bakat kepimpinan ahli akademik telah dibangunkan berpandukan dua kategori utama iaitu data prestasi (yang diperolehi dari pangkalan data berkaitan pengajaran dan pembelajaran) dan data kecekapan (yang diperolehi dari borang soalselidik kecekapan ahli akademik).

Rajah 2 memaparkan antaramuka bagi sistem pengkelasan dan peramalan bakat kepimpinan ahli akademik. Sistem ini dapat membantu ahli akademik dalam mengenalpasti kelompok bakat kepimpinan masing-masing samada berada pada kelompok *Educator, Trainer, Master Trainer* dan *Mentor*.

Kombinasi kelompok bagi data prestasi dan data kecekapan dari soalselidik akan menghasilkan graf bakat kepimpinan ahli akademik seperti di Rajah 3. Merujuk kepada Graf Bakat Kepimpinan Ahli Akademik seperti di Rajah 5, paksi – *x* ialah data prestasi yang berfungsi untuk mengkelaskan mengikut kelompok, manakala paksi – *y* ialah data kecekapan yang berfungsi untuk menentukan tahap kecekapan ahli akademik berdasarkan markah soalselidik yang diperolehi dari diri sendiri, rakan sekerja dan pegawai atasan.

Rajah 1: Rangka Kerja Pengurusan Bakat Kepimpinan Ahli Akademik
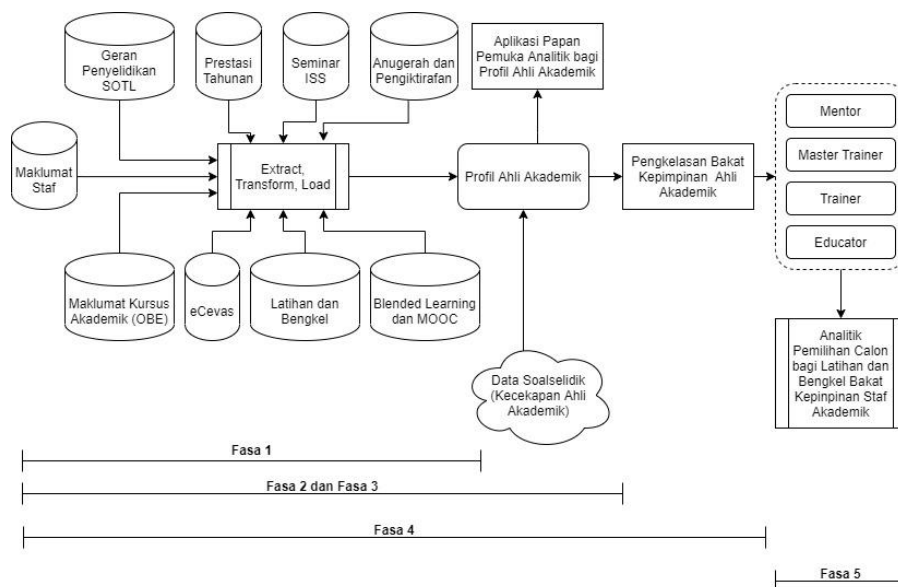
Rajah 2. Sistem AcaProf bagi Modul Pengkelasan dan Peramalan Bakat Ahli Akademik bagi Data Prestasi

Rajah 3. Graf Bakat Kepimpinan Ahli Akademik
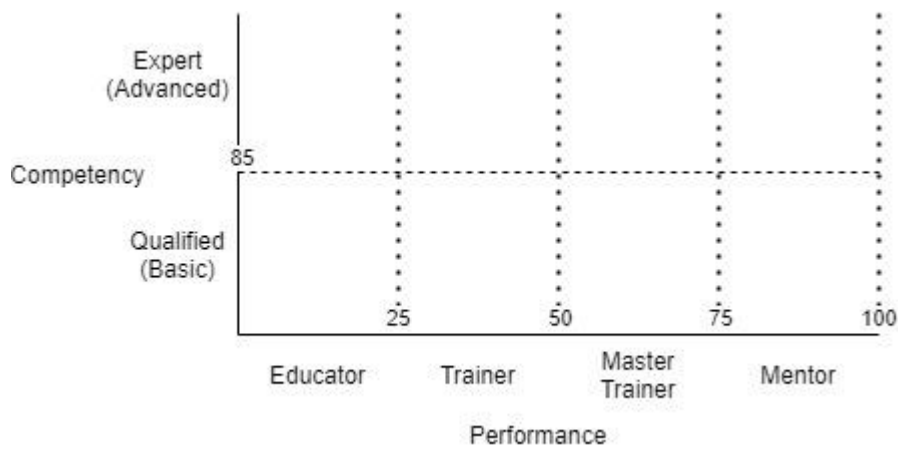
Berpandukan Graf Bakat Kepimpinan Ahli Akademik setiap ahli akademik akan memperolehi nilai yang akan dapat menentukan kedudukan bakat kepimpinan berdasarkan nilai pada paksi - x (prestasi) dan nilai pada paksi – y (kecekapan).

Rajah 4. Contoh nilai pada paksi – *x* dan paksi – *y* untuk seorang ahli akademik
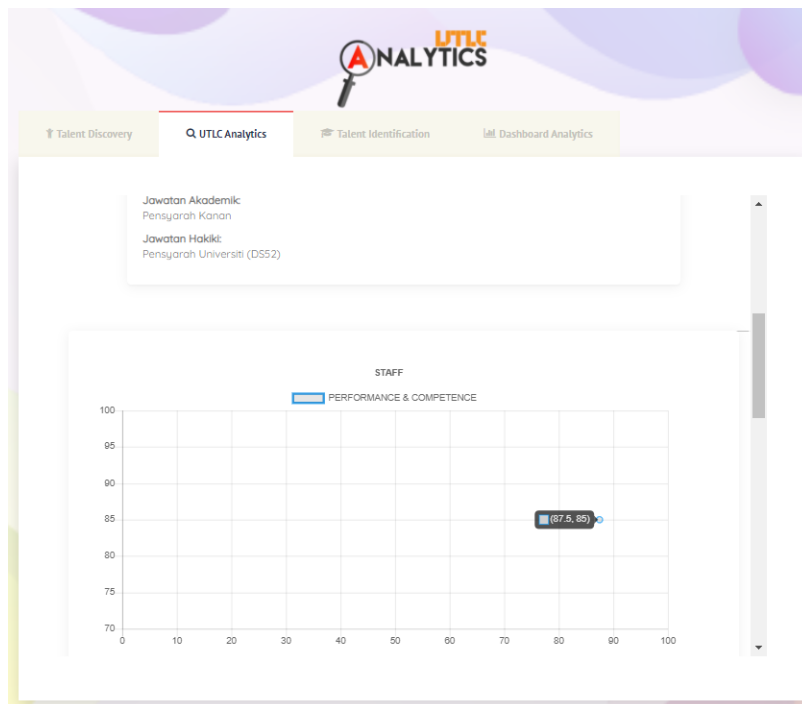
Merujuk kepada Rajah 4, ahli akademik ini akan berada pada paksi – *x* (*Mentor*) untuk Prestasi dan pada paksi –*y* (Expert (Advanced)) untuk Kecekapan.

Jenis latihan yang telah dikenalpasti berdasarkan 4 kelas utama iaitu *Readiness,* Practicing, *Engaging* dan *Coaching*. Pemilihan calon secara data analitik ini akan dapat membantu organisasi merancang latihan dan bengkel yang bersesuaian dengan bakat ahli akademik. Sekaligus ini dapat meningkatkan kehadiran latihan dan bengkel berdasarkan ciri unik dan keperluan setiap ahli akademik. Sistem AcaProf ini dapat capai di alamat seperti berikut https://acaprof.tlgateway.edu.my/

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3DIG FRAMEWORK: DESIGN AND DEVELOPMENT OF DIGITAL INSTRUCTIONAL GAME FRAMEWORK

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Highlights: Designing and developing instructional games encompasses a challenging process that is time-consuming and costly. Therefore, it is crucial to introduce Design and Development of Digital Instructional Game Framework (3DIG Framework) for facilitating the design and development of instructional games especially for learning grammar. It is hoped that 3DIG Framework can reduce time and cost in designing and developing instructional games.

Key words: framework, design and development, digital games, game elements

Introduction

Digital instructional games are engaging thus they can increase students' participation in learning. Instructional games designed and developed by instructors are essential to support learning since the games can be designed using a specific content that is aligned with the syllabus. Moreover, the game elements selected in the game design are exclusively selected to meet specific learning needs of students, However, instructors have limited time to design and develop instructional games as the process is time consuming and costly. Therefore, Design and Development of Digital Instructional Game (3DIG) Framework is introduced to facilitate the process of rapid development of instructional games.

Content

3DIG Framework is a comprehensive framework for facilitating the design and development of digital instructional games. It has three stages as follows:

Selection of Game Elements

Appropriate game elements are selected based on their purposes provided in the framework in order to achieve the intended outcomes of the learning activities which are transformed into instructional games. Four learning theories are applied: (1) Cognitive Theory of Multimedia Learning (Clark & Mayer, 2011), (2) Behaviourism (Ertmer & Newby, 2013; Zhou & Brown, 2014), (3) Cognitivism (Ertmer & Newby, 2013; Zhou & Brown, 2014), and (4) Constructivism (Ertmer & Newby, 2013; Zhou & Brown, 2014).

Game Design and Development

Storyboards are developed before the development instructional games. In the Storyboard Development, two frameworks are applied: (1) the Gagne's Nine Events of Instruction (Gagne et al., 1992) and (2) the revised Bloom's Taxonomy (Krathwohl, 2002). In the

Game Development, a suitable application is selected to develop instructional games based on the developed storyboards. Content and design validations are conducted in the Storyboard and Game Development respectively.

Game Testing

Instructional games are tested by conducting research to collect qualitative and/ or quantitative data for determining the target group's attitudes by using Attitude Motivation Test Battery (Gardner, 2005), acceptance, by using Technological Acceptance Model (Davis, 1993) and/ or engagement by using ARCS Motivation Model (Keller, 2010) towards instructional games. Research on the effectiveness of instructional games can also be conducted by employing a quasi-experiment and analysing the data using the T-test (Pallant, 2016).

3DIG Framework is useful for instructors who want to design and develop instructional games, but they have limited time and financial support to be invested in designing and developing instructional games. They do not have to invest a lot of time and money for reviewing literature in order to determine effective game elements and their purposes, and selecting learning theories, frameworks and models to support their game design and development, and game testing. Other users who can use it are instructors and administrators who do not develop instructional games, but they can use the list of game elements for evaluating and selecting instructional games for their students.

Instructional games developed by using 3DIG Framework can be easily shared as Windows games or phone applications on android or IOS systems. The instructional games can be commercialized by monetizing them according to the platform chosen for sharing the instructional games.

Figure 1: 3DIG: Design and Development of Digital Instructional Grammar Game Framework
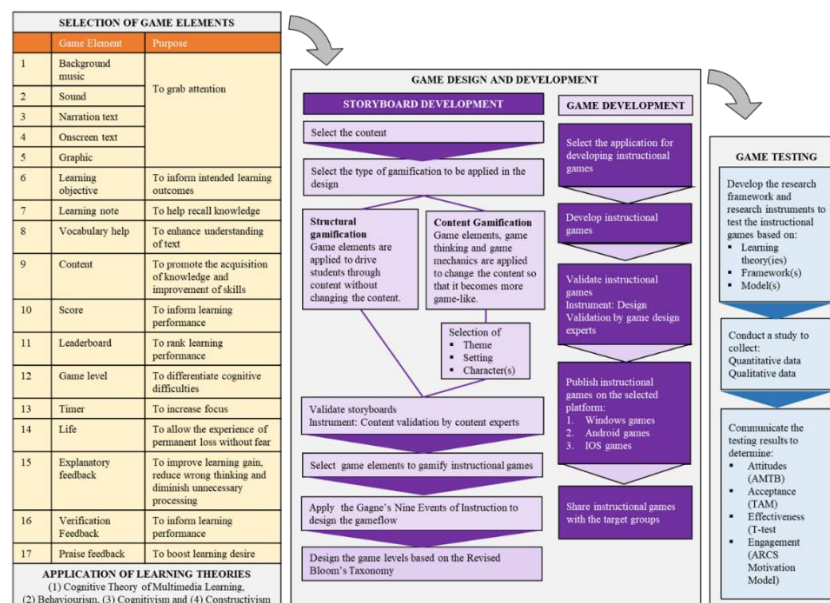
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ARABIC VOCABULARY GAMES ON WORDWALL

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Highlights: Learning vocabulary is tedious and time consuming. Moreover, it is difficult to engage students in participating in vocabulary learning activities. Engaging learning activities need to be designed and developed according to the specific content in order to increase their engagement and support learning the courses enrolled. Therefore, Wordwall was selected to design an activity for learning the Arabic vocabulary for a course offered in Universiti Teknologi MARA.

Key words: *Arabic vocabulary, online game, engagement, gamification elements*

Introduction

Building up vocabulary is crucial in learning the Arabic language. It may help to enhance students' fluency in using the language. Traditionally, learning vocabulary requires repetitive drills and practice. The learning activities are compiled in the workbook or worksheets. The activities are not interactive and feedback from the instructor is usually not immediate. As a results, students may find vocabulary learning activities as tedious and time consuming. Therefore, this may lead to poor engagement in participating in the activities.

It is crucial to provide Arabic vocabulary learning activities that contain engaging features. Online instructional games are known to have features that promote fun and learning. The features that promote fun are contributed by the selection of appropriate gamification elements (Zou, 2020; Koivisto & Hamari, 2019). The content and the gamification elements selected to design the instructional games promote learning to take place. Therefore, Wordwall was chosen to design the online Arabic vocabulary game for learning 20 Arabic words at the intermediate level.

Content

The innovation is transforming the traditional exercises for learning the Arabic vocabulary into digital online quiz games. Previously, students practiced vocabulary exercises in their textbook, and discussions were carried out in class. It was easy to monitor their learning progress as there were face-to-face classes. During the COVID-19 pandemic, students still use the textbook. However, their engagement and learning progress by using the textbook are difficult to be monitored. Therefore, it was decided to design and develop vocabulary learning activities that are engaging, promote learning and their learning progress can be tracked easily.

The instructor decided to design and develop digital online quiz games that contain several gamification elements such as score, timer, verification feedback and leaderboard. The multimedia elements required for designing the game are onscreen text to display instructions, questions, questions, score and leaderboard information, sounds static graphics for verification feedback of response provided by students. Static graphics is also needed to design the questions. Therefore, Wordwall was chosen for the purpose as it provides the gamification elements and support multimedia elements required. Another advantage of using Wordwall is that students can accessed the quiz games via the Wordwall phone app.

Many studies demonstrated that gamification elements enable to increase students' engagement (Reynolds & Taylor, 2020; Ma et al., 2019; Subhash & Cudney, 2018; Turan, 2018). The Arabic quiz games designed and developed on Wordwall apply the following gamification elements for several reasons. Verification feedback, score and leaderboard are provided to promote positive consequences which may make students feel satisfied as to sustain their motivation (Keller, 2010), and provide positive reinforcement (Behaviourism)(Zhou & Brown, 2014). The application of leaderboard and score can also increase extrinsic motivation that may result in promoting the performance quality (Mekler et al., 2017). As for the timer, it can promote intrinsic motivation (Kwak et al. 2018) and challenge (Browne et al., 2014).

The following are the screenshots of the Arabic quiz games designed and developed by using Wordwall.

Figure 1 Screenshots of the Arabic Quiz games on Wordwall

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ASYNCHRONOUS SESSIONS (OFFLINE)

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Highlights: With the rapid change in all types of environment, there is a need to implement electronic learning (e-Learning) systems to expose people in new technologies, products, and services. For e-Learning in technology implementation and effectiveness, we propose a new method called Asynchronous Session (offline). Asynchronous Sessions (offline) is a student-centred teaching and learning method that can be carried out online and offline, there is no set time for the learning to be occurring. Learners can learn anywhere and anytime to gain new knowledge. It involves a coursework that are delivered via web, email and message boards that are posted on an online forums and allows student to complete the work at their own pace.

Key words: e-Learning, asynchronous, offline, student-centered, coursework

Introduction

Today's workforce is expected to be highly educated and to continually improve skills and acquire new ones by engaging in lifelong learning. E-Learning is defined as learning and teaching online through network technologies, is arguably one of the most powerful responses to the growing need for education (Dongsong et al., 2004). Although there are not any accurate statistics to demonstrate the current levels of online learning, in 2020, the COVID-19 pandemic has shifted the vast majority of educational services to an online platform. Online education is significantly more accessible than traditional classroom-based education to many students. Online education is not constrained by location for the teacher or the students, which means that students (and teachers) can participate from all over the world (Bartley and Golek 2004; Ragusa and Crampton 2017) as learners can learn anywhere and can consume their time to gain knowledge of what they want to know and when they need to know.

Online learning environments can be divided into a triad of synchronous, asynchronous and hybrid learning environments. Synchronous learning environments are occur when a real time interaction is presence, which can be link with a nature incorporating activities (Salmon, 2013) such as an instructor's lecture with a facility of questions-answer session. However, a synchronous session requires simultaneous student-teacher presence. On the other hand, asynchronous environments are not bound to time and students can work on their activities at their own pace. A hybrid online environment are a mixed of synchronous sessions and asynchronous set of activities. It is called a hybrid as if it combines with simultaneity and non-simultaneity as an instructional design for both synchronous and asynchronous teaching.

A large part of the current academic research has been identified that web learning situations inside the instructional innovation engage students essentially through specific correspondence. The adequacy of video-conferencing contrasted with close up, personal interaction and capability of video-conferencing in training for geographically remote learners, who don't have access to traditional educational setup, has been proved with incredible benefit.

As a result, these results have built up a discourse on video-conferencing apparatuses that how may be a true media could be used for instruction. However they do not give information on the most effective method that may be utilize to connect the learners with dynamic learning (Bonk and Zhang, 2006).

Motteram and Forrester (2005) determine online learning as specific individualized process but in order to become an active and effective online learner, learners need to have some pre-requisite skills. For example, learners need to know what technologies are being used for the course, ability to search the course material, understanding how to communicate with other learners. Eventually, in order to be successful in online learning, learners need time to learn how to formulate online activities related to their course and adjust their routine while performing with other family members and work responsibilities (Muilenburg & Berge, 2005).

An asynchronous mode of learning/teaching has been the most prevalent form of online teaching so far because of its flexible modus operandi (Hrastinski, 2008). Asynchronous environments provide students with materials in the form of audio/video lectures, handouts, articles and power point presentations. This material is accessible anytime and anywhere via Learning Management System (LMS) or other channels of the sort. Asynchronous e-learning is the most acquire method for online education (Parsad & Lewis, 2008) because learners are not bound to time respond at their own leisure. The opportunity of delayed response allows them to use their higher order learning skills as they can keep thinking about a problem for an extended time period and may develop divergent thinking.

Asynchronous e-learning, commonly facilitated by media such as e-mail and discussion boards, supports work relations among learners and with teachers, even when learners cannot be online at the same time. It is thus a key component of flexibility to e-Learning. In fact, many people take online courses because of their asynchronous nature by combining education with work, family, and other commitments. Asynchronous e-learning makes it possible for learners to log on to an e-Learning environment at any time and download documents or send messages to teachers or peers. Learners may spend more time refining their contributions, which are generally considered more thoughtful compared to synchronous communication (Stefan, 2007).

Asynchronous e-Learning can be challenging to learners as only a carefully devised set of strategies that can keep learners to be engaged and interested in this sort of learning environment to encourage motivation, confidence, participation, problem solving, analytical and higher order thinking skills. Moreover, it is a self-paced system in which the learners have to be self-disciplined to keep themselves active as well as interactive to keep track with activities. Whereas discussions on forums and blogs can keep them active, while going off topics can also distract them. Delayed feedback can be another frustrating factor (Huang & Hsiao, 2012). Moreover, there are insufficient opportunities for socializing and learners have to look for ways of networking with themselves.

Asynchronous Sessions (Offline) For E-Learning

Asynchronous Sessions (offline) is a student-centered teaching and learning method that can be carried out online and offline. It involves coursework delivered by web, email and message boards that are posted on online forums and allows learner to complete the work at their own pace. The main objective of developing this innovation is to allow the process of

teaching and learning that can be implemented in a variety of ways, remote learning can be conducted anytime and anywhere and also to develop lifelong learning opportunities.

Besides, asynchronous learning can also determine by learner's schedule. Materials are provided for learners and instructor for reading, viewing, completing assignments, and evaluating exams as they can access and satisfy these requirements with their suitable schedule, as long as they meet the expected deadlines. Common methods of asynchronous online learning include self-guided lesson modules, pre-recorded video content, virtual libraries, lecture notes, and online discussion boards or social media platforms.

Moreover by asynchronous, learner are able to schedule very demanding. With these type of learning, materials provided are available freely but usually available for learners within a set of time. Therefore, learners can access these materials with the learner's tight schedule. These materials are included with text-based lecture notes, self-guided, interactive learning modules or pre-recorded lectures and podcasts. Asynchronous learning also are not limited to specific time period but also can be access anywhere within the learner's grasp.

Asynchronous Sessions (Offline) Innovation

Asynchronous Sessions (offline) will encourage and helps students learning process by allowing student to complete their task at the time and pace of their choosing and exposing student of technology in learning. Therefore, Asynchronous Sessions (offline) is a method to enhance in teaching and learning process by including multiples of e-Learning tools, such as recorded lecture, audio recording, interactive contents, collaborative group work, formative assessment, content curation, research and problem-based, scenario-based, challenged-based learning activities in order to make the learning process more interesting, flexible and useful in order to satisfy the research needs.

By using this method, students can ask question on their own time and student can respond own time, using e-Learning tools such as web, email or an online discussion board. It's also can increase the probability that information and knowledge will be anchored in students long-term and help lectures improve the activity quality learning and teaching with interesting and enjoyable with interesting and enjoyable e-Learning tools and activity. Figure 1, show the method of implementation asynchronous session (offline) e-Learning.
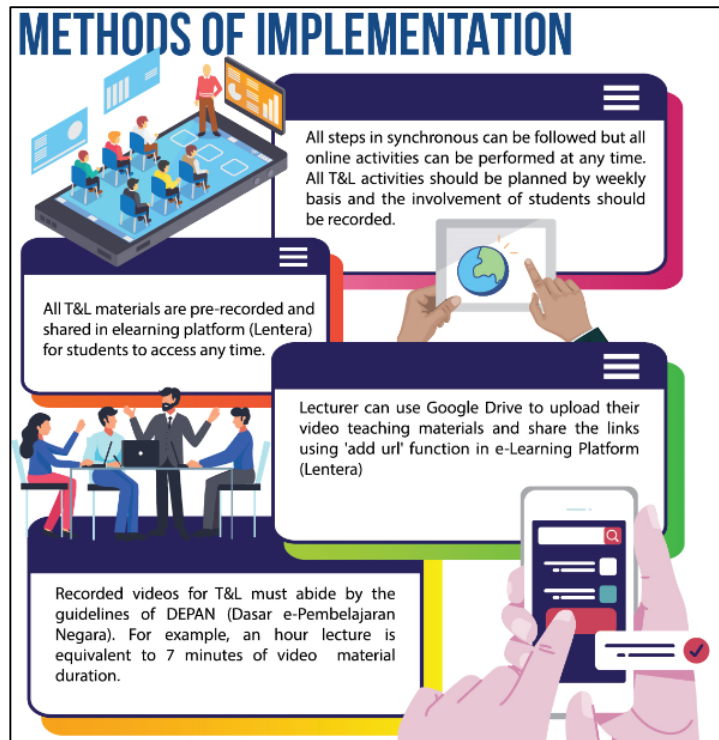
Figure 1: Method of Implementation

Benefits Of Asynchronous Activities

Communication can take place according to the suitability of the instructor and student time

Asynchronous learning can supports individual pacing, allowing learner to spend longer on activities they have identified as areas to work on, and less time on areas they feel more confident in, supporting their development as self-regulated learners as the learners can complete activities within a flexible timeframe, when and where suits them.

Low internet data usage compared to synchronous session and easier for student in remote area to continue their learning activities. Can be access anytime, anywhere by viewing recorded version provided

Learners have more time to reflect because the sender does not expect an immediately answered. In real-time discussions, the 'window' to reply to someone's point of view, or formulate a response to a question, can be quickly missed. However, working asynchronously allows learners time to refine their responses without being pressured to respond quickly, reflecting on complex issues as asynchronous meetings can be scheduled because of work, family, and other commitment.

Flexibility learning process

Learners can complete the activities within a flexible timeframe, whenever suits for them. Learners can develop their higher order thinking skills during asynchronous tasks by integrating and synthesising information from a wide variety of sources in order to connecting ideas (Garrison et al, 2001) that are delivered via e-mail, discussion boards, and blogs. It is a self-paced system in which the allows learner have to be self-disciplined to keep themselves

active as well as interactive to keep track of the activities. Whereas discussions on forums and blogs can keep them active, going off topics can also distract them.

Within learner's set of pace is one of the strongest features of asynchronous learning. These type of learning, learners can access the materials multiple times until they understand with the specific subject. Asynchronous learning also are good to empower learner's understanding of the materials given to them as they can access the materials anytime they wanted.

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e-LEARNING: LIVEHELPDESK

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Highlights: LiveHelpDesk is a suite of tightly integrated online customer service tools for users that known as public help centre. The purpose of a help desk is usually to troubleshoot problems or provide guidance about products such as computers, electronic equipment, courses, apparel, or software. Corporations usually provide help desk support to their customers through various channels as LiveHelpDesk features a Live Chat System, Email-Ticketing Management (e-Ticket), Call Management and a Knowledge Base. It provides a single (or multiple) point of contact for users to gain assistance in troubleshooting, get answers to questions, and solve known problems.

Key words: LiveHelpDesk, Live Chat System, e-Ticket, Call Management, Knowledge Base

Introduction

Modern IT help desks and service desks need to be quick and accurate with respond to a seemingly constant stream of end-user and business-process-affecting IT issues. Keeping track of all the outstanding issues and referencing those that have been solved before, is an important aspect of achieving that speed and accuracy (Serbest et al., 2015). The complexity of modern organizations, and the need to make continual cost savings, also means that help desk effectiveness and efficiency rests heavily on using fit-for-purpose help desk software to support help desk staff and their IT service management (ITSM) processes. It is help desk software that supports incident management and request management with workflow and automation, along with other efficiency and customer-experience-improving capabilities, such as self-service portals, knowledge bases, remote control, self-service password reset, and email integration.

A typical helpdesk can perform several functions that help customer service representatives assist customers. Every helpdesk is different but, at their core, helpdesks are ticketing systems. They connect with communication channels (such as email, social media, live chat, etc.) and push all incoming messages into a single inbox. From there, customer support agents can view and respond to tickets. They can also take advantage of other features to improve their service. Other helpdesk features include automation, data analysis, and reporting. Most helpdesks also have built-in Customer Relationship Management (CRM) systems, tags, and departments. Some helpdesks also provide advanced features like knowledge bases, live chat, or a virtual call centre (Beisse, 2014).

Helpdesk use improves customer engagement because it make it easier for engaging with the users. Social media integrations enable operator to interact with users from their helpdesk dashboards. They can create social media posts, respond to customer comments, and private messages. Operator can also track specific keywords to see what's being said and

allows them to reach out to users when needed. And also allow users to share files, screenshots, and other relevant resources as attachments within the conversation (Shae et al., 2007)

LiveHelpDesk is simple yet powerful online ticketing software forming part of Universiti Malaysia Terengganu (UMT) product Suite. Staffs can use it to manage asynchronous and synchronous user's communication. LiveHelpDesk productivity tools and automation will help user solve problems in a shorter time. The LiveHelpChat integration allows moving cases from chat to your help desk. It enables user to create tickets from ongoing and archived chats as well as assign them to staff that acts like an operator. The staff that involve can also easily monitor the whole ticket history right from the HelpLiveDesk window. This will simplify support activities and let keep communication with users in one place.

Besides, LiveHelpdesk is developed to support online teaching and learning items (PdP) where users can call or make any complaints 24/7 and previously developed users are only given the option to make a complaint by phone call to the office that is only during working hours. With this livechat system, users can make a complaint directly and the response is received by the staff directly wherever they are. LiveHelpDesk features a Live Chat System, Email-Ticketing Management (e-Ticket) and Office Telephone.

7.

e-LEARNING: Livehelpdesk

A helpdesk is a tool that organizes a communication to help operator respond to users more quickly and effectively. Using a helpdesk allows your support team to offer the best possible experience to users. Helpdesks offer features to provide context and insight into user experiences and also provides internal features to benchmark the performance of support team and ensure that team is truly the cream of the crop. Helpdesk tools are one of the most integral tools when it comes to supporting a user's base successfully.

Help desk software facilitates this through prioritization, categorization, automated routing, service level management, and escalation capabilities. It also supports modern help desks across the whole range of their responsibilities. Helpdesk systems bring everyone's interactions into one interface and allow different conversations to be cross-referenced and used for more context in the user experience. It also allows for use of features such as categorization and automation as a means to keep track of what kinds of issues users are experiencing.

With the constantly increasing expectations of users, providing 24/7 support is no more a choice. LiveHelpdesk is developed to support online teaching and learning items (PdP) where users can call or make any complaints 24/7 and previously developed users are only given the option to make a complaint by phone call to the office that is only during working hours. With this livechat system, users can make a complaint directly and the response is received by the staff directly wherever they are. LiveHelpDesk features a Live Chat System, Email-Ticketing Management (e-Ticket) and Office Telephone.

Objectives Of Innovation

LiveHelpDesk allows you to facilitate access whenever you are. Users can access anywhere and anytime to make a complaint by phone call to the office that is only during working hours.

Users can make a complaint directly and the response is received by the staff directly wherever they are. With LiveHelpDesk, users can get help whether they email, chat and call, or message you on social media. And no matter which path users choose, the staff can view and respond to tickets as LiveHelpDesk features a Live Chat System, Email-Ticketing Management (e-Ticket) and Office Telephone.

LiveHelpDesk provide user-friendly as the chatbots, in the LiveChat sidebar will generate leads, create help tickets, and chat across channels. It also greet users and quickly route chats with the help of AI and provides quick access to all user help problem. The staff will have all this knowledge at their fingertips, any time users need it as staff can give feedback directly in return. The staff will solving problems for users based on their knowledge. LiveHelpDesk also makes it easy for them to focus on solving problems without getting bogged down with administrative or technical work and distribute information quickly and more effectively to the users.

Besides, LiveHelpDesk bring everyone's interactions into one interface and allow different conversations to be cross-referenced and used for more context in the customer experience. It also allows for use of features such as categorization and automation as a means to keep track of what kinds of issues the users are experiencing and also record all conversations to prevent it from being left out. All ticket of complaint information and conversations that have been created will restore in 'chats list' for future need according to time and date.

e-Learning platforms integrated with virtual communication features where connecting users in real-time is the ultimate objective of any e-learning platforms such as Live Chat System, Email-Ticketing Management (e-Ticket) and Office Telephone. It also function as a learning management system that allows creating questions for the users who wants to share and deliver their question as LiveHelpDesk offer a comprehensive eLearning solution for all categories and it also allows an enhanced user management experience in order to maximize the use of the e-Learning platform.

Method Of Implementation

There are three method for LiveHelpDesk to implement. First is e-Ticketing. Each e-Learning staff can view the complaint and each e-Ticket sent by the staff will receive the notice in the telegram. In e-Ticketing, each complaint received is only related to e-Learning while those that are not related will continue to be sent to the Technical Support Unit at PPPTK and this can be achieved with the determination of keywords that have been developed in the e-Ticket.

Next is Live Chat. Live chat support allows users to have text-based conversations with support teams via the web. Using live chat software embedded on the company's website, users can send their questions to a staff that in charge who can quickly reply to them in the same small window. Each chat conversation will be direct straight to the staff and every staff can control staff computers remotely and they are responsible for answering queries and addressing system and user issues in a timely and professional manner.

Figure 1 show the conversation that take place between staff that in charge and the learner.
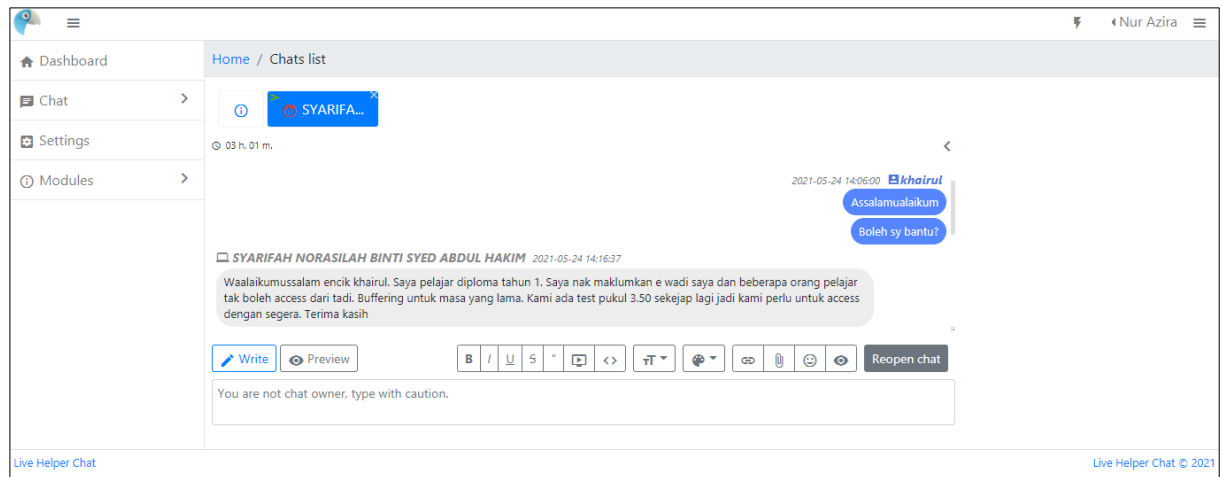
Figure 1: The conversation in the Live Chat

The last method is office telephone. An office telephone refers to a place or area where telephone calls are handled, and is often used to describe an organization's department of support that will support the operators. This method will directly connect to EXT and staffs will help lecturers and student until the problem is resolved.

Impact For Unit / Department / Organisation

Various medium are provided in supporting services and assistance in the implementation of online teaching and learning

LiveHelpDesk bring user's interactions into one interface and allow different conversations to be cross-referenced and used for more context in the user experience. It also allows for use of features such as categorization and automation as a means to keep track of what kinds of issues the users are experiencing. For example, Live Chat System, Email-Ticketing Management (e-Ticket) and Office Telephone.

Complaints can be made anytime anywhere as long as the internet access is accessible

By using LiveHelpDesk, it can reduce walk-ins and duplicate tickets by making user-specific announcements of outages and planned maintenance. The user support can be anywhere, no matter where the users are. It also can keeps track of requests coming from everywhere and transforms them into tickets. With LiveHelpDesk, user can access your tickets anytime, on any device, using any operating system.

Responses and feedback are available quickly

Besides LiveHelpDesk offering the end users a faster and more immediate way of getting their answers and with the help of AI (chatbots) will greet the user. LiveHelpDesk can handle and manage requests with same issues. If staff spot that an issue is reported frequently, they can prepare better for answering the customer and in order fixing the problem. And if the staffs is not available or offline, LiveHelpDesk will let the staffs know when a new ticket arrives by getting an email notifications about tickets.

Complaints ticket will be turn in according to time and date of the complaint made

Furthermore, LiveHelpDesk will gather all user complaints into one common help desk system that restore in 'chat list'. Here where the staff can keep track of what kinds of issues the users are experiencing. All the complaint ticket information and conversations that have been created will restore in 'chats list' for future need according to time and date.

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PROSEDUR E-PEMBELAJARAN UMT: PEPERIKSAAN DALAM TALIAN

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Highlights: The recent outbreak of Corona Virus Disease 2019 (Covid-19) has affected society on a global scale, particularly in the areas of social sciences and behavioural aspects. Despite the alarming rate at which the virus is spreading, potential vaccines and treatments remain under clinical trial. Therefore, the most effective strategy to manage this situation would be through social distancing. In the context of the Malaysian education system for teaching and learning items (PdP), government to come up with an alternative academic assessment to secure learner future, and the concerning virtual education.

Key words: Covid-19, Malaysia education system, teaching, learning, academic assessment, virtual education

Introduction

The initial outbreak of novel coronavirus disease 2019 (COVID-19) began in December 2019 from the Wuhan city of China, while in early 2020 it appeared in other parts of the world (Sahu, 2020). Due to the human-to-human transmission capability of the disease, the World Health Organization (WHO) declared the COVID-19 plague a public health emergency of international concern (Spina et al., 2020). In the same vein, 107 countries had implemented national school closures in response to the COVID-19 pandemic (Viner, et al., 2020).

Globally, universities have either cancelled all campus events including conferences, workshops, sports and other programmes and have rapidly moved to change many courses and programmes from physical to online delivery mode (Gewin, 2020). Remaining review of literature shows that the closure of schools due to COVID-19 has impacted 1,198,530,172 learners in 186 countries (UNESCO, 2020). To slow the transmission and ease the burden of the health system, the Malaysian Government included school closure as part of the physical distancing policy. Some higher education institutions (HEIs) are cut unprepared, while other universities that are proactive have their contingency online learning tools at hand. Nevertheless, the online teaching mode is new and requires an upskill and, in some cases, reskill by the academic sector.

In Malaysia, the disease appeared at the end of February 2020. On 11 March, 2020, an alarming number of cases were reported after the religious gathering in Seri Petaling (Reuters, 2020). In congruent with the WHO guideline, the country implemented a movement control order (MCO) on 18 March 2020. With the implementation of the MCO, all classes were moved to e-learning (Menon, 2020). The MCO has been extended over a few phases (See et al., 2020): the second phase of the MCO (1–14 April 2020), the third phase of the MCO (15–28 April 2020), the fourth phase of the MCO (29 April 2020–3 May 2020), the fifth phase of the conditional movement control order (CMCO) (4–11 May 2020), the sixth phase of the CMCO (12 May 2020–9 June 2020), the seventh phase of the recovery movement control order

(RMCO) (10 June 2020–31 August 2020) and the eighth phase of the RMCO (1 September 2020–31 December 2020).

During this COVID-19 outbreak, the government has decided that all educational institutions are closed and not allowed to operate. For courses of study that have a final examination assessment component, it is highly recommended to replace the final examination with non -face -to -face and summative assessment. This alternative assessment is not tied to the final examination date stated in the University's academic calendar. Alternative assessments can be done at any time at the end of the semester. As a result, teaching and assessment activities have been conducted from a distance, generally online.

Because of the COVID-19 outbreak, most higher education institutions decided to close their campuses. Prior to the pandemic, Universiti Malaysia Terengganu (UMT) offered the online examination. The recent shift to online course delivery in higher education requires additional solutions to be developed to measure and certify students' acquisition of knowledge and skills from a distance. Several practical solutions can be considered to adaption-site examinations to remote online settings. Beyond these adaptations, this crisis allows for deeper reflection on how examinations could be conducted in the future.

The online examination system has ushered a revolution in how examinations are being conducted traditionally. The online exam advantages are multi-fold, especially with the ongoing pandemic impacting the global education landscape. Online exams have ensured educational continuity, providing the option of taking an exam remotely in a secure virtual environment using the latest technology. There are several benefits of an online examination system as it is conducted digitally to evaluate students' academic knowledge and understanding of the curriculum. It also offers creativity to devise new ideas and solutions. Typically, evaluations continue to be based on the pen-and-paper approach, wherein students are gathered and handed the question paper to be completed within the allotted time. Students submit their answer sheets, and examiners disclose their scores after the evaluation.

Exam In The New Norm

Due to the Covid-19 pandemic that nearly crippled the world and the country's movement control order (MCO) that resulted in strict social distancing measures, varsities had to find alternative ways to conduct their exams. Digital Ecosystem Centre (PED), the PED responsible for administering the online examination in UMT. Prior to COVID-19, the examination was administered in person. However, the pandemic compelled us to rapidly change our approach to supporting our students and avoid interrupting the flow of new entrants to the profession. Figure 1 shows the procedures of e-Learning: Online Examination that will conducted in UMT.
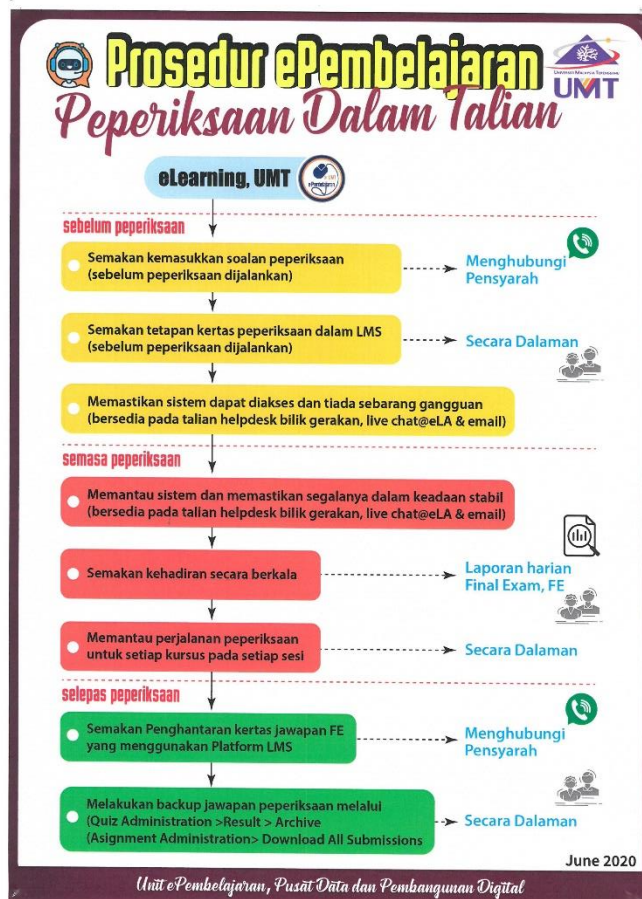
Figure 1: e-Learning Procedure, UMT

The COVID-19 pandemic and its far-reaching implications will continue to unfold in many sectors globally. Education has changed dramatically with distinctive rise of online learning, where teachings are done remotely on digital platforms. In Malaysia, the implementation of the MCO in the middle of March 2020 resulted in education sector to fully switch to online learning and the government has decided that all educational institutions are closed and not allowed to operate. For courses of study that have a final examination assessment component, it is highly recommended to replace the final examination with non - face -to -face and summative assessment. This alternative assessment is not tied to the final examination date stated in the University's academic calendar. Alternative assessments can be done at any time at the end of the semester.

Preparing For And Testing Online Examination

There are three stages in method of implementation for the online final examination. Each stages contain its own method. The first stage is before the exam. During this stage, the examination question must be check during its entry. Next, the examination paper settings must be reviewed in LMS and the system must be ensured to be accessible and uninterrupted.

Conducting Online Examination

The second stage is during the examination. During this stage, the system must be monitored at all time and make sure everything is stable. Next, attendance reviews must be check periodically and the course of the examination must be monitored or a set of courses at each sessions.

Post Online Examination

The last stage is after the examination. The first thing to do is to review all the submission of the final examination answer papers by using the LMS Platform. Next is backup all the exam answers by archive it using Quiz Administration or download all the submissions using Assignment Administration.

Some Learnings

Making the final examination management more orderly and smooth

The enormity of the task is known to everyone involved in designing, managing and evaluating assessments, from students to teachers. One of the essential benefits of an online examination system is that it reduces the time invested in overseeing the entire examination process. The exam platform saves precious time for both students and teachers, which would otherwise be wasted on repetitive tasks. The exam software features the option of adding and importing questions, enabling students to access the exam and facilitating batch-wise examinations.

Traditionally, exam distribution demands adequate time for end-to-end management. On the contrary, the benefits of an online examination system have expedited the process. Examiners can merely upload the email ids of the participants and invite them for the assessment; the most notable aspect is the instant generation of the results.

The process of obtaining data collection for the examination without face to face is feasible

The all-pervasive nature of technology and its impact on the way of life is blurring the difference between real and virtual. There is a considerably lower use of pen and paper in the digital age. A vast majority of professionals rely on computers for emails, presentations, digital designing and various other tasks. Human preference has altered considerably with the infusion of technology.

One of the main advantages of an online examination system is the ease-of-use for the administration and the students and make the process of obtaining data collection without face to face is feasible. The examiners can easily set up the questionnaire, determine the grading and send invites to students. Meanwhile, students can take exams remotely. Even participants from remote areas can attend the exam. Moreover, there is no scope of question paper leaks as every student gets a randomly selected set of questions as per the arrangement determined by the examiner.

Able to facilitate the interaction of various examination management according to the level and turn by referring to the procedures designed

Exams can be conducted anywhere. All that a student needs is a personal computer with internet connection. A student does not need a long commute to exam venue as long as these requirements are met. This also means that thousands of students can take the same exams over a wide spread of locations. Examiners do not have to bother with the laborious task of marking exams as this is well taken care of by the system. The system actually marks each exam and presents the result to the student at the end of the exam. Examiners are also afforded the opportunity to create exam online through an online examination system that can present examinations in multiple languages. Multiple exams on multiple subjects for multiple courses can also be set. Exams can also be configured for 24/7 availability. This allows candidates to take exams at their own convenience.

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REMOTE TRAINING FOR EDUCATORS DURING COVID-19

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Highlights: In March of 2020, tertiary education institutions in Malaysia across the globe closed their doors to decrease the spread of the viral outbreak during the COVID -19 pandemic. This physical closure led to a rapid shift to remote learning which placed major impact on education and on educators. Large-scale, national efforts to utilize technology in support of remote learning, distance education and online learning during the COVID-19 pandemic are emerging and evolving quickly and has been the largest disruption to education systems in history. There are a discovery that unveil university worldwide are moving towards online learning or e-Learning and remote learning as an essential in times of lock downs and social distancing due to the pandemic.

Key words: *tertiaty education institutions, COVID-19, remote learning, distance education, online learning, e-Learning.*

Introduction

An overwhelming majority of the world's enrolled students have experienced the temporary closing of school during the COVID-19 pandemic in an attempt to encourage social distancing and therefore decelerate the transmission of the virus (Viner et al., 2020) and also turning educators' lives upside down. The Corona virus also has revealed emerging vulnerabilities in education systems around the world. It is now clear that society needs flexible and resilient education systems. Against the backdrop of the COVID-19 outbreak various policy initiatives are being launched by governments and tertiary institutions across the world to continue teaching activities so as to contain the virus. However, there is ambiguity and disagreement about what to teach, how to teach, the workload of teachers and students, the teaching environment, and the implications for education equity (Zhang, Wang, Yang, & Wang, 2020).

The Covid-19 has certainly impacted the tertiary education industry. Tertiary education institutions in Malaysia faced financial losses, disruptions in schedules and ongoing classes while staff and students face additional stress. In the medium term, rising unemployment among contractual staff is to be expected as tertiary education institutions find ways to cut costs. The quality of teaching will definitely be impacted as well. By and large, most private and public tertiary education institutions in Malaysia have relied on face to face lectures and tutorials. Tutorials are especially important for students as this is the time for smaller groups of students to discuss their lecture, to debate ideas and to present their work. It is also the time when lecturers can properly evaluate the students' performance. Besides the content of the courses, tutorials are also meant to let students practice presentation skills. Although this can be done via online teaching, the quality of interaction will be compromised.

Therefore, many universities and colleges were forced to make swift changes to move to online teaching when MCO was imposed. But this comes with several challenges. First, even if students and lecturers can get pass the technical difficulties, one cannot assume that all tertiary students enjoy unlimited internet access or possess laptops or desktops that allow them to attend online classes freely. The Internet Users Survey 2018 conducted by the Malaysian Communications and Multimedia Commission, for example, found that there is a sizeable disparity between urban and rural internet users. Urban users make up for 70.0 % Internet users (Malaysian Communications and Multimedia Commission, 2018) and forcing school systems and students to quickly attempt remote learning.

Challenges that may impact parental involvement in remote learning settings include economic resources (Hohlfeld et al., 2010), lack of internet access (Hollingworth et al., 2011), lack of interest of in using technology (Beckman et al., 2019) and having low digital self-efficacy (Povey et al., 2016). From research done on virtual school learning environments, pre-pandemic, we learn that parents become a learning coach for students who spend a significant amount of their day in an online setting (Hasler Waters & Leong, 2014).

The infection control and physical distancing measures are crucial to prevent the virus from further spreading and to help control the pandemic situation (World Health Organization, 2020). The policy of compulsory physical distancing has been implemented in many countries (Quinn et. al., 2020; Bennardo et. al., 2020), resulting in nationwide school and university closures. In accordance with this policy, dental academic institutions are compelled to make appropriate and timely modification in order to continue to deliver education and to sustain the continuation of student academic progress. The teaching and learning activities were immediately shifted to a full e-learning. E-learning is defined as learning that makes use of Information and Communication Technologies (ICTs). The incorporation of technological resources and innovative education strategies has transformed the teaching and learning processes.

Online teaching has to be continued as long as the risk of Covid-19 exists. However, some degree of flexibility should be allowed. For instance, universities and colleges can allow staff to go to campus on staggered schedules to record their lectures and to settle their administrative work. Certainly, clear SOPs such as temperature checking, social distancing should be followed. Despite the temporary closure of UMT's physical operations, learning and teaching continue through UMT remote learning approaches. Technology facilitated seamless migration of face-to-face learning to virtual platform accessibility during the control order.

To ensure learning continues during this unprecedented time with the situation, UMT is adopting various educational technologies to mitigate the risk of interruptions to daily teaching and learning. The e-Learning Unit and Talent Development Center, UMT had taken the initiative to conduct training to strengthen the skills of lecturers using the e-Learning platform. Therefore there is structural block of training by aiding and facilitating staffs are to ensure the teaching and learning processes take place and running.

Objectives Of Innovation

The Remote Training for Educators was initiated by faculty and staff leads who expressed interest in providing support during emergency remote teaching and provide support but needed a community to learn with and from during the pandemic. Although most of the

resources and technologies are not new and were used at various institutions before this pandemic, social distancing has necessitated rapid innovation and exploitation of these resources to maintain clinical care and education while ensuring personal safety.

The focus of higher education's COVID-19 adaptations is on remote learning and working. As for the Remote Training for Educator, its allow educators to improve their knowledge and skill by learning new things to support student success will be equally critical to help students complete courses and attain credentials. As education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. With Remote Training for Educators, the quality of education and their assessment of educators competence and the level of government readiness to support learning at home during lockdown will be increase.

Besides, digital technology played a significant role in enabling educator to teach learners at a distance using tools that enabled both synchronous and asynchronous communication with whole class and group. This allow educators to make a preparation for learning and examination because it will allow educators access to learning materials and interactive and collaborative activities. It emerge an opportunities and considerations for educators to moving forward for the contemporary role of technology in education and forming a positive characters as their knowledge and experience with remote learning programs.

Methods Of Implementation

Working remotely is on the rise and slowly becoming the new normal, which means the need for organizations to provide remote training is also growing. Remote training is a type of employee training that takes place at a distance, and is a part of learning and development process as aimed at person who work from home or remotely rather than at an office. Remote learning, also referred to as distance learning, gives learners who are not in a physical location for in-person education, access to online training materials. Remote training is usually delivered through virtual classes, online courses, podcasts, webinars, and other e-learning tools.

As nowadays because of the pandemic Covid-19, live online learning takes communication and collaboration to another level. Deliver engaging courses where people learn from one another, and where the technology facilitates and enhances the learning experience. For example, online webinars. With using online webinars, it will allow on-site training sessions and on-demand training. As it more affordable option since it eliminates or significantly minimizes all of these costs, which is why more organizations are moving toward this training approach.

Besides in order to help educators maximize the potential of online learning, the Remote Training for Educators will provide remote Teaching and Learning Series. These series will equip educators with effective strategies and best practices for designing and delivering online instruction to all learners. The wide variety of series will teach participants about managing the day-to-day responsibilities of remote teaching and learning, collaborating and keeping learners safe and engaged online. Educators also will discover teaching strategies and skills that engage technology for the remote classroom in order bring ease and joy to the teaching environment.

Furthermore by attending an online training to get the knowledge, the Remote Training for Educators will provide Q&A (Questions-and-Answers) sessions. Q&A sessions are formats that allow audiences to ask questions to the speakers. In order to know their knowledge and understanding of a topic, a Q&A sessions will provide to give a chance for them to ask questions to leadership, or raise any concerns and get immediate feedback.

Impact For Unit/Department/Organisation

Try to minimize confusion, disruption and uncertainty for educator

The Remote Training for Educators will improved knowledge retention for the educator. Remote training prevents educator from being left behind by ensuring continuous learning and development, which is beneficial for both educator and the organization. By using Q&A session approach, educators can asking question in order to increase their understanding, skills and knowledge.

Expanding the scope of work and assignments

The Remote Training for Educators has much more flexibility and accessibility compared to more traditional methods. Like remote working, digital learning modules can be completed across multiple devices, such as laptops and mobiles. So despite the fact that a large number of employees may be away from the office for a period of time, they will still be able to log on and complete their training. Having a training schedule offers greater flexibility also improves employee motivation and engagement, as they are free to complete it at a time most suitable for them. It is the accessibility, flexibility and personalisation to each learner that ultimately improves team performance and increases knowledge retention.

Increase competence for staff and organization

A knowledgeable, skilled and well-trained workforce is critical to an institution's success. Improving competencies allows an organization to remain adaptable and competitive, ultimately contributing to increased productivity and greater revenue. The Remote Training for Educators, essential to provide staff with opportunities to apply their newly acquired knowledge and skills. Moreover, it creates a more personal experience and helps with knowledge retention.

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SYNCHRONOUS SESSIONS (ONLINE)

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Highlights: The coronavirus pandemic (COVID-19) has generated changes in the teaching-learning process in higher education institutions and has influenced the interaction between instructors and learners. As a consequence of the pandemic, universities were constrained to carrying out their activity with learners exclusively online. For e-Learning in technology implementation and effectiveness, we propose a new method called Synchronous Session (online) in order to ensure the continuity of the educational process. Synchronous Sessions (online) is a kind of e-Learning session that involves online studies that conducted in real time and allow instant feedback.

Key words: COVID-19, synchronous, online, e-Learning, educational process, real time

Introduction

The educational system across the world has immensely been affected due to outbreak of COVID-19, the contribution of information technology has gained momentum due to closure of educational institutions that raises challenges for learners' learning. COVID-19 also demanded containment and enforced isolation that tremendously affected personal interaction between instructors and students. In the absence of traditional classroom teaching and one-to-one interaction, computer-based learning has emerged as closest substitute for off-line teaching.

Educational institutions and students across the world have accepted and appreciated the online platform of learning. The reasons of this acceptability are easy to use, learning flexibility and controllable environment (Dhawan, 2020). Thus, information technologies and E-learning systems are seen as essential factors in carrying out the activity of universities, these institution are investing more and more in online systems and devices (Popovici and Mironov, 2015). It can also improve interaction with students by providing asynchronous and synchronous tools such as e-mail, forums, chats, videoconferences (Abou et al, 2014).

In online learning environments, it can be divided into a triad of synchronous, asynchronous and hybrid learning environments. Synchronous learning environments are occur when a real time interaction is presence, which can be link with a nature incorporating activities (Salmon, 2013) such as an instructor's lecture with a facility of questions-answer session. However, a synchronous session requires simultaneous student-teacher presence. On the other hand, asynchronous environments are not bound to time and students can work on their activities at their own pace. A hybrid online environment are a mixed of synchronous sessions and asynchronous set of activities. It is called a hybrid as if it combines with simultaneity and non-simultaneity as an instructional design for both synchronous and asynchronous teaching.

A large part of the current academic research has been identified that web learning situations inside the instructional innovation engage students essentially through specific correspondence. The adequacy of video-conferencing contrasted with close up, personal interaction and capability of video-conferencing in training for geographically remote learners, who don't have access to traditional educational setup, has been proved with incredible benefit. As a result, these results have built up a discourse on video-conferencing apparatuses that how may be a true media could be used for instruction. However they do not give information on the most effective method that may be utilize to connect the learners with dynamic learning (Bonk and Zhang, 2006).

Motteram and Forrester (2005) determine online learning as specific individualized process but in order to become an active and effective online learner, learners need to have some pre-requisite skills. For example, learners need to know what technologies are being used for the course, ability to search the course material, understanding how to communicate with other learners. Eventually, in order to be successful in online learning, learners need time to learn how to formulate online activities related to their course and adjust their routine while performing with other family members and work responsibilities (Muilenburg & Berge, 2005).

As for synchronous e-learning is refers to learning or teaching that taken place simultaneously via an electronic mode. Learners and instructors experience synchronous e-learning as more social and avoid frustration by asking and answering questions in real time. Synchronous voice or text chat rooms provide an opportunity of teacher-learners and learner-learner interaction. Apart from chat, video-conferencing facilitates face-to-face communication. Web conferences through surveys, polls and question-answer sessions can turn out to be more interactive than video conferencing. A synchronous virtual classroom is a place for instructors and learners to interact and collaborate in real time. Using webcams and class discussion features, it resembles the traditional classroom, except that all participants access it remotely via the Internet. Lessons can be recorded and added to an e-library (Huang & Hsiao, 2012).

One benefit of synchronous sessions is that all participants are online together at the same time, which may increase a feeling of presence, immediacy, and community in their online classroom. Many learners take online courses because of the flexibility and convenience, and we should alert them early if the course requires them to meet at a predetermined time. However, some of the challenges of synchronous education can be the need of the availability of learners at a given time and the necessary availability of a good bandwidth Internet. Learners can feel frustrated and thwarted due to technical problems. In addition, a carefully devised instructional design is required as pedagogy is more important than technologically facilitated media (Murphy et al., 2011).

Synchronous Sessions (Online) For e-Learning

Synchronous sessions are real-time educational activities which allow instructors and course lessons occur live through video conferencing software (Salmon, 2013). Specified times when learners and instructors "meet" online to discuss course content, answer questions. This are most closely mimics the in-classroom environment, because it creates a sense of speed and intimacy that helps build a classroom community. This includes in-person classes, live online meetings when the whole class or smaller groups get together. In synchronous learning, students usually go through the learning path together, accompanied by instructors who is able to provide support while learners are completing tasks and activities. Synchronous interaction

also eliminates the isolation that asynchronous online training involves, as it promotes collaboration and fosters a sense of community.

Synchronous learning enables learners to ask questions and receive answers on-the-spot, while also collaborating freely with their co-learners. This session can be helpful toward learners to improve learner outcomes is to have a professional facilitator available to teach and answer questions along the way. The instructor can offer real-time insights to students to help them understand while gaining the ability to receive instant feedback on the quality of their instruction to improve upon themselves. Synchronous e-learning provides a space for instructors to interact with students to improve the class's success rate.

For some learning styles, a synchronous online format is actually an improvement over classroom learning because it allows for more a dynamic exploration of topics, ideas, and concepts. However, synchronous online learning have a feels of speed and immediacy. Synchronous online learning can make it possible to ask between teacher and peers questions and receive answers mid-lesson, by not being in a lecture hall meaning that learners can do their own research on the side without disrupting the class (Salmon, 2013).

Synchronous online learning can be access online from any location with an internet or Wi-Fi connection. By using an online synchronous delivery model, institutions and corporations can save money and make learning cost effective for learners. Synchronous instruction is in real time and includes much of the benefits of face-to-face learning but mitigates the cost involved because it can be scaled up and down with minimal infrastructure cost (Salmon, 2013). Also, learners and instructors save money and time spent on traveling to physical locations and more people can be taught more frequently with no additional cost.

With synchronous online learning, learners can interact regularly and frequently with their instructors and can also strengthen their relationship. This regular opportunities provide face-to-face discussion, individual guidance, and mentorship without having to schedule an appointment.

Synchronous Sessions (Online) Innovation

Synchronous teaching allows online students to interact with instructors and peers in real time (McBrien et al., 2009). Therefore, Synchronous Sessions (online) is a method to enhance teaching and learning process by including multiples of e-Learning tools, such as live sessions, student presentation, discussion or forum, collaborative group work, interactive learning activities, coaching and consultation in order to make the learning process more interesting, flexible and useful in order to improve learner's sense of community and social presence.

By using this method, students can ask question directly and can be responded immediately by instructors, using e-Learning tools such as web, email or an online discussion board. It can also can help instructors improve the activity quality learning and teaching with interesting and enjoyable e-Learning tools and activity. Figure 1, show the method of implementation synchronous session (online) e-Learning.
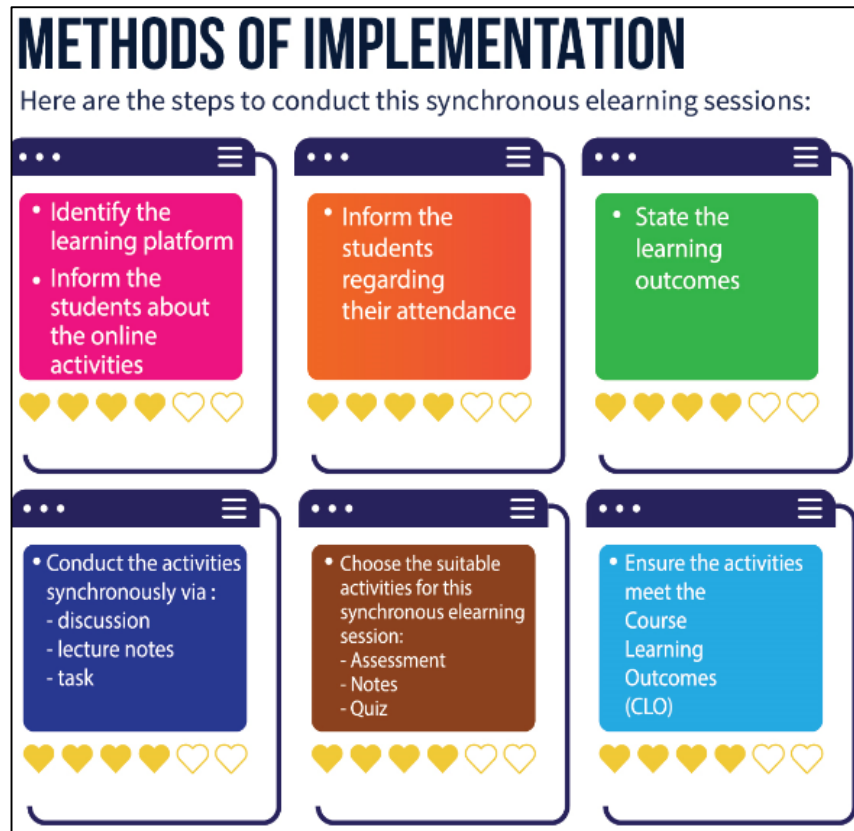
Figure 1: Method of Implementation

Benefits of Synchronous Activities

Knowledge transfer can be carried out in various way

Synchronous learning environments provide real time interaction, which can be collaborative in nature incorporating activities (Salmon, 2013) such as a teacher's lecture with a facility of questions-answer session. It will takes place simultaneously via an electronic mode, allow learners experience to an online synchronous delivery format such as videoconferencing, IM and chat, and complement with face-to-face meetings. Synchronous voice or text chat rooms provide an opportunity of teacher-learners and learner-learner interaction. Apart from chat, video-conferencing facilitates face-to-face communication. Web conferences through surveys, polls and question-answer sessions can turn out to be more interactive than video conferencing.

Bilateral Learning Communication takes place directly and all question can be answered spontaneously and not delayed

Synchronous learning refers to all types of learning in which learners and instructors are in the same place, at the same time, in order for learning to take place. This includes in-person classes, live online meetings when the whole class or smaller groups get together. In synchronous learning, learners usually go through the learning path together, accompanied by their instructor who is able to provide support while learners are completing tasks and activities. The instructors can present their course content and have a dialogue with their learners in real-time. If someone has a question, then it can be answered in a timely fashion, immediate feedback.

Provide opportunities for the development of social networks between students from various backgrounds.

Learners become more committed and motivated because a quick response is expected as discussion and collaboration in real time. Virtual classroom is not only can replicate the real classroom experience, but they can improve by offering a suite of collaborative tools to encourage active learning. Tools like Breakout Rooms encourage practice and discussion, digital whiteboards for interactivity, and screen sharing for teaching others, all work together to bring life to the classroom experience. This method can give learners the ability to engage with the content, the instructor and each other in ways that asynchronous e-learning cannot match. By looking at the highest retention categories, i.e. discussion, practice, teach others, learners and instructor and also other learner piece together the value of collaboration and engagement through group learning and work.

Lectures and students are in the same virtual space in real time. However, they do not have to be in the same place.

Synchronous online learning happens in real time. This actually means that learners and instructor can interact with each other in a specific virtual place at a set of time. In these courses, instructor commonly take attendance, as the same they would in a lecture hall. Common method of synchronous online learning are include with video conferencing, teleconferencing, live chatting, and live-streamed lectures that must be viewed in real time.

Online Synchronous learning also can be accessed online from any location with an internet or Wi-Fi connection and give all participants, learners and instructors, the opportunity to engage, collaborate, and interact with one another. Also, learners and instructors save money and time spent on traveling to physical locations and more people can be taught more frequently with no additional cost.

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SETTING UP ONLINE TAECHING AND LEARNING SESSIONS DURING COVID-19 PANDEMIC

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Highlights: Online learning is an educational process which takes place over the Internet as a form of distance education. Distance education became ubiquitous as a result of the COVID-19 pandemic during 2020. In order to minimize the impact of the pandemic on education and control the spread of the pandemic, online teaching has become a necessary strategy to restore the normal teaching order in this special period. To face these difficulties in teaching, Ministry of Health are encouraging blended learning a blended learning strategy in the context of teaching and learning as the standard practice as long as Covid-19 remained a threat.

Introduction

The deadly and infectious disease Corona Virus also known as Covid-19 has deeply affected the global economy. This tragedy has also shaken up the education sector, and this fear is likely to resonate across the education sector globally. The Covid-19 pandemic outbreak forced many schools and colleges to remain closed temporarily. Several areas are affected worldwide and there is a fear of losing this whole ongoing semester or even more in the coming future. Various schools, colleges, and universities have discontinued in-person teaching. As per the assessment of the researchers, it is uncertain to get back to normal teaching anytime soon. As social distancing is preeminent at this stage, this will have negative effects on learning opportunities. Educational units are struggling to find options to deal with this challenging situation. These circumstances make us realize that scenario planning is an urgent need for academic institutions (Rieley, 2020). This is a situation that demands humanity and unity. There is an urgent need to protect and save our learners, faculty, academic staff, communities, societies, and the nation as a whole.

Several arguments are associated with e-learning. Accessibility, affordability, flexibility, learning pedagogy, life-long learning, and policy are some of the arguments related to online pedagogy. It is said that online mode of learning is easily accessible and can even reach to rural and remote areas. It is considered to be a relatively cheaper mode of education in terms of the lower cost of transportation, accommodation, and the overall cost of institution-based learning. Flexibility is another interesting aspect of online learning; a learner can schedule or plan their time for completion of courses available online. Combining face-to-face lectures with technology gives rise to blended learning and flipped classrooms; this type of learning environment can increase the learning potential of the learners. Learners can learn anytime and anywhere, thereby developing new skills in the process leading to life-long learning. The government also recognizes the increasing importance of online learning in this dynamic world.

With the rapid developments in technology have made distance education easy (McBrien et al., 2009). "Most of the terms (online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning, for ex.) have in common the ability to use a computer connected to a network, that offers the possibility to learn from anywhere, anytime, in any rhythm, with any means" (Cojocariu et al., 2014).Online learning can be termed as a tool that can make the teaching–learning process more learner-centered, more innovative, and even more flexible. Online learning is defined as "learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access.

The COVID-19 pandemic undeniably accelerated the process of transition to full online instruction and provided opportunities to carry out effective online teaching and learning. Online teaching and learning is an educational process which takes place over the Internet. It is a form of distance education to provide learning experiences for learners, both children and adults, to access education from remote locations or who, for various reasons, cannot attend a school, vocational college, or university. Distance education addresses issues related to geographical distance but also for many other reasons which prevent in-person attendance at classes (Hrastinski 2008; Moore et al. 2011; Singh and Thurman 2019; Watts 2016; Yilmaz 2019).

As the immediate future is uncertain with new outbreaks and looming lockdowns, many Lectures had to consider online instruction, which can be given in one of three pedagogical approaches which are synchronous, asynchronous and blended learning strategy. In synchronous online lectures (real-time), lectures and learners meet online using a video conferencing software during the designated class hours and lectures give lectures on the course. Learners participate in the lectures and are able to ask questions vocally or via live text chat. In asynchronous lectures, lectures record lecture videos and upload them in Blackboard learning management system (LMS) or YouTube, so that learners can access them in their most convenient time.

The blended online learning strategy is deemed to be the most practical method to adapt as this combines the advantages of synchronous and asynchronous strategies. The main motivation in choosing the blended strategy is to increase the learner's participation in their own learning process rather than quietly sitting during a synchronous discussion (Darabi and Jin, 2013; Seery and Donnelly, 2012; Seery, 2013).

Due this lockdown, a portion of the syllabus could be completed by conducting online classes. This will help teachers cover the syllabus after the educational institutions reopen. Consequently, conducting exams on time will help maintain the flow of study for learners. In addition, learners will be engaged in studies during this lockdown. By conducting teaching and learning sessions with the help of ICT. Nowadays, we have a lot of open-source LMS solutions like Moodle, Edmodo, Google Classroom, Chamilo, and Canvas.

Setting Up Online Taeching and Learning Sessions during Covid-19 Pandemic @UMT

The Covid-19 epidemic has forced the learning and teaching process to be conducted online, where leaners and lecturers have been instructed to comply with the Movement Control Order (PKP) which began on 18 March. Until June 29, 2020, the government still set the Rehabilitation Movement Control Order, PKPP is continued and the University must comply

with the guidelines that have been set where the teaching and learning items (PnP) process must be conducted online.

From time immemorial, faculty lecturing in a classroom setting, learners listening, taking notes, asking questions, and getting those questions answered have been the backbone of traditional academic education (O'Malley and McCraw, 1999). With advancements in communication technology such as the telephone, radio, television and most recently the internet, new methods of learning, including distance learning, have emerged (shah, 2016). Through the internet, learners can now obtain instruction and learn with ease at home by simply clicking a few buttons on the computer to listen live or asynchronously to a professor thousands of miles away, interact with the professor, and solve problems without having to physically be in a classroom (O'Malley and McCraw, 1999).

As the secretariat for e-Learning at the University level of Universiti Malaysia Terengganu (UMT), Digital Ecosystem Centered has been directed for the learning process conducted by the lecturers for online teaching and learning items (PnP) process. There are several method that can be conducting for online teaching and learning sessions such as asynchronous session and synchronous session with learning applications are existing and can be used according to current suitability and needs.

Objectives of Innovation

Educational institutions had to adopt a digital approach for instruction and learners learning, dramatically transitioning traditional in-person classroom instruction to predominantly distance learning where teaching is provided remotely on digital platforms of online teaching and learning process. There are several step for implementation of online teaching and learning. First, setup all the resource. This first step is crucial because educator need to figure out on what to teach to the learners. Next is setup all the activities. This step is to make the learners not bored during the learning sessions. The more fun the activities for the learner, the more successful the teaching and learning session. The third step is setup the assessment. After the learning session, the educator need to know how well the learners take on learning the courses. This assessment are great indicator for how well the teaching and learning session is. The last step is by communicate with the learners. This step is also crucial topic. This is because the educator are going to know how well the session is going for the learners. The smoother the communication with the learners, the more it easier for the educator to know how the session going.

Online learning systems are web-based software for distributing, tracking, and managing courses over the Internet. It involves the implementation of advancements in technology to direct, design and deliver the learning content, and to facilitate two-way communication between learners and faculty (Thanji and Vasantha, 2016). They contain features such as whiteboards, chat rooms, polls, quizzes, discussion forums and surveys that allow lectures and learners to communicate online and share course content side by side. These can offer productive and convenient ways to achieve learning goals. With the help of advanced technology including variety of online teaching and learning delivery techniques, these are a convenient ways to achieve learning goals.

Figure 1: Infographics of learning applications are available and can be used according to current suitability and needs.

Online learning can be termed as a tool that can make the teaching–learning process more learners-centered, more innovative, and even more flexible. The online learning environment also allows educators and learners to work and exchange ideas and information together on projects, around the clock and from anywhere in the world, using multiple communication modes and a variety of activities for learners assessment. For example, institutions can use Microsoft Teams, Google meet, Edmodo and Moodle as learning management systems along with their applications for video conferencing. Other commonly used video conferencing solutions include Zoom, Skype for business, WebEx and Adobe connect etc.

Nowadays, there a lot of open-source LMS solutions like Moodle, Edmodo, Google Classroom, Chamilo, and Canvas that educators can inform learners through email or WhatsApp about the time and topic of the online class. Learners can also stream educator video tutorials live on YouTube. After a tutorial, educators can answer learners' questions on WhatsApp by using a group chat. Following this by sharing the related assignments on Google Classroom.

Impact for Unit / Department / Organisation

Lectures have a variety of options to practice with their respective student and however it is up to the lectures to use techniques that are comfortable with them

Online learning and teaching involve a diverse array of tools, resources, pedagogical approaches, roles, organizational arrangements and forms of interaction, monitoring and support (Bates and Poole, 2003; Bullen and Janes 2007; Bach, Haynes and Smith 2007). Within this cornucopia of options, 'the capacity for shifting the time and place of the educational interaction' (Anderson et al. 2001) stands out as a valued source of flexibility. From a post digital point of view, online education has blurred boundaries between material, digital and

human experience (Fawns 2019). In making the most of the opportunities afforded by online learning environments, instructional design and organization play an essential role (Anderson et al. 2001)

With learning-centered instruction, lectures take on the role of facilitating and sharing information while guiding learners toward solutions. Lectures as well as learners must take on new roles in the teaching-learning relationship, and faculty must be willing to release control of learning to the learners. Online learning environments also require a range of interactive methodologies. Lectures find that when adapting courses to online models, they pay more attention to the instructional design of their courses. As a result, the quality, quantity, and patterns of communication learners practice during learning improve. Therefore, more consideration should be given to the technical and interactive features of online education when evaluating these platforms and courses.

The changing from face-to-face lectures to online classes is the only possible solution. Indeed, academic institutions would not be able to transform all of their college curricula into and online resource overnight. Distance, scale, and personalized teaching and learning are the three biggest challenges for online teaching. Innovative solutions by institutions can only help us deal with this pandemic (Liguori & Winkler, 2020). There is a requirement of a quick shift to online learning mode such as Gmail, Google Forms, Calendars, G-Drive, Google Hangouts, Google Jam board and Drawings, Google Classroom and Open Board Software. These tools can successfully be used as an alternative for face-to-face classes (Basilaia et al., 2020).

Besides, institutions can use Microsoft Teams, Google meet, Edmodo and Moodle as learning management systems along with their applications for video conferencing. Other commonly used video conferencing solutions include Zoom, Skype for business, WebEx and Adobe connect etc. and nowadays, there a lot of open-source LMS solutions like Moodle, Edmodo, Google Classroom, Chamilo, and Canvas that educators can inform learners through email or WhatsApp about the time and topic of the online class that lectures can choose to use based on their teaching and learning method process suitability.

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UMTMOOC©: ESTUARINE AND MANGROVE ECOLOGY

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Highlights: Massive open online courses (MOOCs) in Malaysia are a very recent development. Malaysia embrace the concept of 'Free for education, pay for certify'. In order to fulfil the aspirations of the Ministry of Higher Education (MOHE) in realizing the 9th Leap which is Global Online Learning as a new leap in higher education, UMTMOOC© has developed 25 courses from 2015 until 2021, i.e. Estuarine and Mangrove Ecology. This is one of the 10 leaps proposed in the Malaysian Education Development Plan (Higher Education) 2015-2025. All UMTMOOC© courses have been uploaded on the official UMTMOOC© platform which is https://umtmooc.umt.edu.my/.

Key words: Massive open online courses, Ministry of Higher Education (MOHE), Global Online Learning, UMTMOOC©, higher education, platform

Introduction

Over the past few years, the rapid growth of information and communications technology has provided many new delivery methods for learning (Ertmer and Newby 2013; Thomas and Brown 2011). Among these methods include online learning, blended learning, MOOCs, podcasting, OER, OCW, and flipped classrooms. MOOCs provide on-demand access to free higher educational courses for people around the world. Therefore, higher education have speculated about dramatic changes that must occur to accommodate more learners at lower costs and to make easier changing from gathering knowledge by acquiring a variety of cognitive and non-cognitive skills (Griffiths, 2013). All scenarios feature a major role for technology and online learning. Massive open online courses (MOOCs) are the most recent platform being pushed forward to fulfil these ambitious goals. To date, there has been little evidence collected that would allow an assessment of whether MOOCs do indeed provide a cost-effective mechanism for producing desirable educational outcomes at scale as online education at the college level has been expanding rapidly over the last decade with students participating in single courses.

The first MOOC in Malaysia, for instance, was introduced in 2014 (Fadzil et al., 2015; Ghazali and Nordin, 2017). Not too surprisingly, the growth of MOOCs in Malaysia has led to the increasing research attention related to Malaysian MOOCs (Al-Atabi and DeBoer, 2014; Ayub and Leong, 2017; Dahlan et al., 2015; Nordin et al. 2016) as MOOCs provide on-demand access to free higher educational courses for people around the world. The factors underpinning these shifts in learning are due to various reasons, including the rapid development of the Internet and learning technology, the birth of a new generation of learners, and the shifting of teaching methods toward more learner-centred approaches (Ertmer and Newby, 2013; Thomas and Brow,n 2011). Considering the potential benefit of MOOCs within education, the Malaysian government made national plans related to MOOCs in order to support their use in higher education (Fadzil et al., 2015). Examples of existing MOOCs platforms are Coursera, edX, Udacity and OpenLearning.

MOOC designs are challenging due to their massiveness as well as the open nature of MOOCs which consider MOOCs to be very suitable for teaching and learning of concepts, methods and theories, for obtaining practical skills and competences and last but not least, for boosting the sense of innovation and the creativity of the educational process participants (Bersin, J., 2013). Nevertheless, how a MOOC is designed will have a significant impact on students' learning and outcomes (Drake et al. 2015). Attraction to the course will affect students' decision to enrol in the course as well as their ultimate retention rates. In order to increase student participation and motivate them to complete the course, the instructors stated that their courses offered certificate, badge, points, or transfer credit is one strategy to increase student enrolment in MOOCs (Drake et al. 2015).

Based on Daradoumis et al. (2013), the top design challenges for MOOC instructors include encouraging collaboration, participant engagement, video development, and various time constraints. Naturally, high levels of collaboration might be difficult due to time differences. As noted by Guàrdia et al. (2013), collaboration problems and issues may also result from low encouragement from the instructors or due to unclear statements of the overall course expectations A couple of other issues and challenges that these MOOC instructors mentioned are worth noting. For instance, a major challenge with video development is the ability to shrink lengthy course materials into short video segments or just one shorter segment, while also designing these to be attractive, clear, and highly functional. Thus, it is important for the institution to provide guidance and training to MOOC instructors, or assign a video maker professional to support such MOOC instructors in designing their courses (Richter and Krishnamurthi 2014).

Malaysia Education Development Plan 2015-2025 (Higher Education) has outlines MOOC as one of the initiatives key to achieving Leap 9 - Global Online Learning (GOL). The MOOC initiative offers an advantage in terms of access extensive and inclusive as well as enabling flexible learning in terms of time and place. Higher Education Institutions (IPT) are advised to take advantage of MOOC capable of building a global brand and featuring deep expertise in essence of the university. Empowerment of MOOCs will contribute to the transformation of the country's higher education. To meet the needs of wider access to education, Malaysia adopts the concept of "Free for Education, Pay for Certify". In 2015, the Malaysian Ministry of Education collaborated with four public universities, National University of Malaysia, University Putra Malaysia, MARA University of Technology, and University of Malaysia Sarawak, to launch Malaysia MOOCs (Nordin et al., 2016).

The MOOC initiative at UMT has started since 2015 under the UMTMOOC© platform. The UMTMOOC© course developed is based on UMT's thrust areas by using the specific expertise of UMT lecturers. The development of UMTMOOC© aims to strengthen the national education agenda and demand hybrid learning, which is a combination of face-to-face learning and online learning with the use of information and communication technology for the development of student human capital. Since 2015 until 2021, 25 courses of UMTMOOC© has been developed and uploaded on the official UMTMOOC© platform, https://umtmooc.umt.edu.my/. UMTMOOC© courses are targeted at unlimited participation and open access via the web as it globally accessible, free of charge. It includes course planning, lecture notes, instructional videos, learning activities and interactions with students as well as online learning assessments.

Mooc as Education Development Plan

According to the Ministry of Higher Education's (MOHE) blueprint on higher education, MOOCs will be developed to support higher education as part of a globalized online earning shift (Ismail and Seng 2016). Furthermore, Ismail and Seng (2016) stated that MOOCs are used to increase the market value of Malaysian universities' graduates. Aligned to the previous statement which can be found on the MOHE's blueprint (Chapter 10: Globalized Online Learning), MOOCs are believed to offer many benefits including: interactive and engaging delivery that promotes high-quality collaboration and international interactions, global visibility and access to Malaysian expertise areas, and the opportunity to showcase outstanding educational programs and research(Fadzil et al. 2015). In 2014, the Higher Education Ministry of Malaysia selected OpenLearning as the national MOOC platform for Malaysian public universities (Chonghui, 2016; Sahyoun, 2014). By late 2017, OpenLearning already consisted of around 257 courses from 20 Malaysian public universities. At the present time, roughly 328 Malaysian MOOC courses are offered in OpenLearning.

Each UMTMOOC$^©$ course is developed by a group of developers with led by a coordinator appointed by the Responsibility Center (PTj). Member the group consists of a combination of field experts, experienced lecturers and will teach the course, students, industry/community experts and designers course content. UMTMOOC$^©$ course content must emphasize on usage teaching and learning items (PdP) that ensure students achieve outcomes learning. The selection of appropriate PdP elements includes materials, activities and assessment appropriate to the discipline of knowledge and the target student is necessary developed based on each predefined development component. Developed PdP items must be in digital form and use functionality appropriate within the selected platform.

Estuarine and Mangrove Ecology

A vital course community that enables social learning is a key for MOOCs on creativity and innovation. Successful MOOCS in this field have engaged and socially active communities of students/learners that pose problems, solve questions, add additional material to the class, and support other students' learning. MOOCs are designed to allow users to learn by themselves. A focus is put on interactive assignments. Scalability and the creation of an engaging and interesting learning experience is also key. An engaged community with a pool of creative minds can stimulate learners and high-quality peer-to-peer feedback can motivate them to contribute creative assignments themselves.

For UMTMOOC$^©$ course Estuarine and Mangrove Ecology, this course explains the ecology, importance and expanse of estuaries and mangrove areas in the world, particularly in Malaysia. Specifically, the topics that will be discussed in this course cover the characteristics and types of estuaries and mangroves, as well as their adaptation, distribution, biological diversity, food network and nutrient cycle. Apart from that, the economic importance of, threats to, management of and scientific studies at estuaries and mangrove areas will also be discussed.
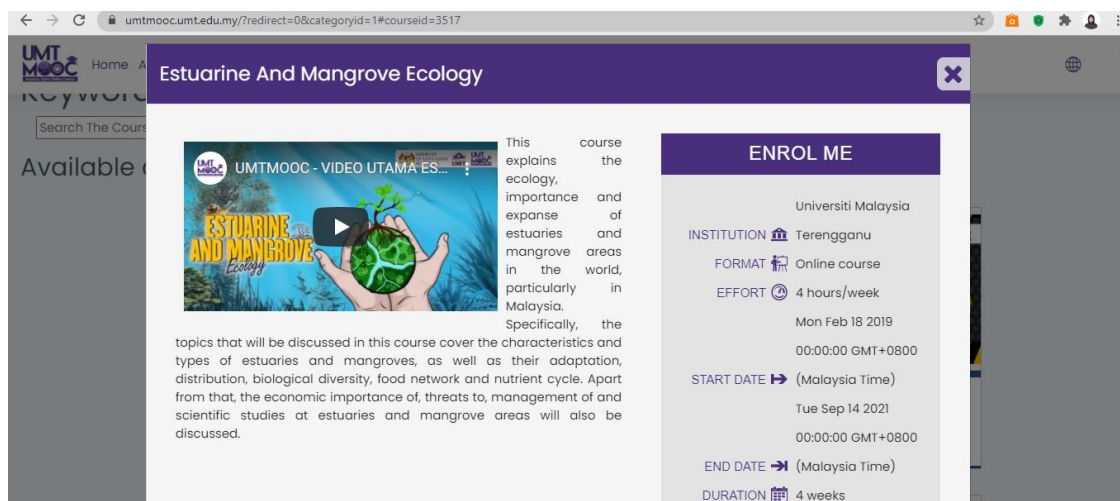
Figure 1: Estuarine and Mangrove Ecology Interface

This course allow learners to be expose from fundamental and key characteristics covering the biology, chemistry and physics of the estuarine and mangrove ecosystems. Furthermore, this course also teaches techniques for using instruments and practical and fieldwork methods. While explaining the importance and functions of the estuarine and mangrove ecosystems.

Table 1: Details and Brief Description of Estuarine and Mangrove

1	Course Name	Estuarine and Mangrove Ecology	This course explains the ecology, importance and expanse of estuaries and mangrove areas in the world, particularly in Malaysia. Specifically, the topics that will be discussed in this course cover the characteristics and types of estuaries and mangroves, as well as their adaptation, distribution, biological diversity, food network and nutrient cycle. Apart from that, the economic importance of, threats to, management of and scientific studies at estuaries and mangrove areas will also be discussed.
	Institution	Universiti Malaysia Terengganu (UMT), Malaysia	
	Platform	UMTMOOC©	
	Web link	https://umtmooc.umt.edu.my/?redirect=0&categoryid=1#courseid=3517	
	LECTURES/ INSTRUCTORS	• Dr. Maizah Mohd Abdullah • Assoc. Prof. Dr. Behara Satyanarayana • Dr. Siti Mariam Muhammad Nor • Assoc. Prof. Dr. Siti Aishah Abdullah • Dr. Yusof Shuaib Ibrahim	

Malaysia MOOCs courses offered by public universities are free of charge. Fees may apply if students wish to obtain a credit award for the MOOCs course. Malaysian MOOC courses can be given credit and the Malaysian Qualifications Agency (MQA) has issued MOOC Credit Transfer Guidelines.

The Potential of Moocs for Innovation Centred Education

Malaysia MOOCs is the first initiative in the world that brings together all first year students from 20 Malaysian public universities using one platform. It marks the first involvement by Malaysian public universities in MOOCs. Currently, all Public Universities, Community Colleges and some IPTS have offered MOOCs courses through the OpenLearning platform that can be followed by anyone regardless of age, educational background, gender,

type of institution and so on. MOOCs benefit the Malaysian higher education system as MOOCs can increase student enrollment, improve the quality of teaching, internationalize Higher Education Institutions (IPT) and reduce the cost of delivering course content.

According to Norvig (2012), MOOCs have had a remarkable ability to attract large numbers of learners to a vigorous online learning community as it can increase and improve quality of the learner experience. The constant availability makes MOOCs an excellent resource not only for students, but also for all life-long learners and modern professionals striving for on-going career development and personal improvement. MOOCs have always been a great format to exchange ideas among participants, to study and develop creative processes and foster innovation. This is due to several factors, including the fact that participants in Massive Open Online Courses are usually very diverse.

Determinants of Successful UMTMOOC© Course

MOOCs course helps by explaining the biological, chemical and physical characteristics of the estuarine and mangrove ecosystems

Based on MOOCs courses, this course help learners by explaining the biological, chemical and physical characteristics of the estuarine and mangrove ecosystems. This gives learns the ability to receive input from the lectures in the course and interact with the course subsequently. This course also increase learners' innovation and creative outputs by simply enabling them to unleash their creative potential.

Have knowledge of the research techniques employed in scientific studies involving estuarine and mangrove ecosystems

The course are capable to help learners to have the knowledge on researching techniques when employing in some scientific studies as learner able to improve their sense of earning of concepts, methods and theories, for obtaining practical skills and competences .

Correlate the ecological functions of estuarine and mangrove areas with the effects of human activities upon them.

Furthermore, learners are able learn to match between the ecological functions of estuarine and mangrove areas and the effects of human activities upon them as boosting the sense of innovation and the creativity of the learners. The online platform also allows learners to explore dozens, which often leads to further inspiration for their own work in creative assignments.

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UMTMOOC©: VIRTUAL LEARNING METHOD

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Highlights: Massive open online courses (MOOC) are considered a modern e-learning technology that was initiated by the Malaysian higher education in 2015 offer the possibility of entirely virtual learning environments, with lectures, discussions, and assignments all distributed via the internet. The virtual nature of MOOCs presents considerable advantages to students in terms of flexibility to learn what they want, when they want. In order to fulfil the aspirations of the Ministry of Higher Education (MOHE) in realizing the 9th Leap which is Global Online Learning as a new leap in higher education, UMTMOOC© has developed 25 courses from 2015 until 2020. This is one of the 10 leaps proposed in the Malaysian Education Development Plan (Higher Education) 2015-2025. All UMTMOOC© courses have been uploaded on the official UMTMOOC© platform which is https://umtmooc.umt.edu.my/.

Introduction

The effect of information technology on human life is immense and its role in education cannot be subsided. In the current scenario of COVID 19 pandemic, the contribution of information technology has gained momentum due to closure of educational institutions that raises challenges for students' learning. During this quarantine time, information technology is serving the solution for the ongoing learning process through innovative and learning management systems (Zayabalaradjane, 2020; Muzaffar et al., 2020). It has provide opportunity for educators to implement IT solutions for teaching as well as evaluation for the completion of course work of students. The efforts of stakeholders namely teachers, students and institutional administrators are on for the optimal use of the technology and efficient learning process (Henderson, 2020). The ultimate goal is to minimize the learning gap that arouse due to lockdown and the Malaysian Government Movement Control Order, commonly referred to as the MCO or PKP.

Educational institutions and students across the world have accepted and appreciated the online platform of learning. The reasons of this acceptability are ease of use, learning flexibility and controllable environment. However, despite its multiple advantages there are quite a few limitations of e-learning such as social isolation, face to face interaction between teacher and student, connectivity and issues (Sá and Serpa, 2020). E-learning has never been adopted and accepted as real learning or the formal mode of education before this ongoing pandemic that compelled to resort to electronic learning solution by world over (Mahajan, 2018). Now at the hour of pandemic crisis, most of the educational institutions are exploring and approaching towards e-learning to make it easy for students to work out at new normal. Also, various e-teaching software are being explored by teachers or educators to bring maximum possible ease for their students (Nassoura, 2020).

Massive Open Online Courses (MOOC) are large-scale e-Learning online classes that are developed by higher educational institutions as a platform for learners and instructors to engage in active learning (McGovern & Baruca, 2013). The idea of integrating MOOCs into the higher education system is to ensure that university courses are accessible globally to a diverse number of learners and give opportunities for learners to participate in a shared and collaborative learning experience (Hew & Cheung, 2014). MOOC also targets lifelong learning that is open (Hood, Littlejohn, & Milligan, 2015) which indicates that the participation in a course is not determined by prior academic skills. The contents of a course are mainly delivered through videos and forums, and are evaluated through online assessment which can simultaneously encourage peer-to-peer teaching (Shapiro et al., 2017). Therefore, the idea of using MOOC in higher education is also to establish necessary online social and academic support which is usually prevalent in a traditional classroom setting (Mendoza, Jung, & Kobayashi, 2017).

MOOC designs are challenging due to their massiveness as well as the open nature of MOOCs which consider MOOCs to be very suitable for teaching and learning of concepts, methods and theories, for obtaining practical skills and competences and last but not least, for boosting the sense of innovation and the creativity of the educational process participants (Bersin, J., 2013). Nevertheless, how a MOOC is designed will have a significant impact on learners' learning and outcomes (Drake et al. 2015). Attraction to the course will affect students' decision to enroll in the course as well as their ultimate retention rates. In order to increase student participation and motivate them to complete the course, the instructors stated that their courses offered certificate, badge, points, or transfer credit is one strategy to increase student enrollment in MOOCs (Drake et al. 2015).

In Malaysia, MOOC is considered a new initiative by the government to boost the technological level of public and private universities (Norazah, Helmi, & Mohamad Amin, 2016) as it is open and massive courses provided in virtual learning environments that allow participants to share experiences, knowledge, and information. The Malaysian government is very supportive of the use of MOOC and sees it as a platform to integrate learning technology, lifelong learning and concurrently lead the way towards a new direction in teaching methodologies for undergraduate programmes (Ministry of Education of Malaysia, 2012). The Malaysian MOOC was firstly launched in 2015 through an official MOOC platform for public higher learning institutions called OpenLearning.com. These MOOCs are developed by instructors or lecturers based on the needs set by their institution. Malaysia Education Development Plan 2015-2025 (Higher Education) has outlines MOOC as one of the initiatives key to achieving Leap 9 - Global Online Learning (GOL). The MOOC initiative offers an advantage in terms of access extensive and inclusive as well as enabling flexible learning in terms of time and place (Azizi, 2017). In 2015, the Malaysian Ministry of Education collaborated with four public universities, National University of Malaysia, University Putra Malaysia, MARA University of Technology, and University of Malaysia Sarawak, to launch Malaysia MOOCs (Nordin et al., 2016).

The MOOC initiative at UMT has started since 2015 under the UMTMOOC© platform. The UMTMOOC© course developed is based on UMT's thrust areas by using the specific expertise of UMT lecturers. The development of UMTMOOC© aims to strengthen the national education agenda and demand hybrid learning, which is a combination of face-to-face learning and online learning with the use of information and communication technology for the development of student human capital. Since 2015 until 2021, 25 courses of UMTMOOC© has been developed and uploaded on the official UMTMOOC© platform, https://umtmooc.umt.edu.my/. UMTMOOC© courses are targeted at unlimited participation and open access via the web as it globally accessible, free of charge. It includes course

planning, lecture notes, instructional videos, learning activities and interactions with students as well as online learning assessments.

UMTMOOC© as Virtual Learning Method

Massive Open Online Course (MOOC) is an innovative approach to teaching and learning. MOOC offers 100% teaching and learning items (PdP) through online with free or paid registration. The development of MOOCs combined with the digital revolution has shown new trends and opportunities for today's education and the development of digital media technology. Now, Higher Education is undergoing a paradigm shift in how video -based learning resources are delivered. Internet technology has enabled interactive video -based delivery along with technologies such as mobile phones have enabled the flexibility of learning and depending on the time of the student. The main concept of UMTMOOC© delivery is real learning based on video Learning. All materials including instructional videos are compiled with specific regularity and quality. It is combined with the use of real video, graphics and animation.

According to the Ministry of Higher Education's (MOHE) blueprint on higher education, MOOCs will be developed to support higher education as part of a globalized online earning shift (Ismail and Seng 2016). Furthermore, Ismail and Seng (2016) stated that MOOCs are used to increase the market value of Malaysian universities' graduates. Aligned to the previous statement which can be found on the MOHE's blueprint (Chapter 10: Globalized Online Learning), MOOCs are believed to offer many benefits including: interactive and engaging delivery that promotes high-quality collaboration and international interactions, global visibility and access to Malaysian expertise areas, and the opportunity to showcase outstanding educational programs and research(Fadzil et al. 2015). In 2014, the Higher Education Ministry of Malaysia select OpenLearning as the national MOOC platform for Malaysian public universities (Chonghui, 2016; Sahyoun, 2014).
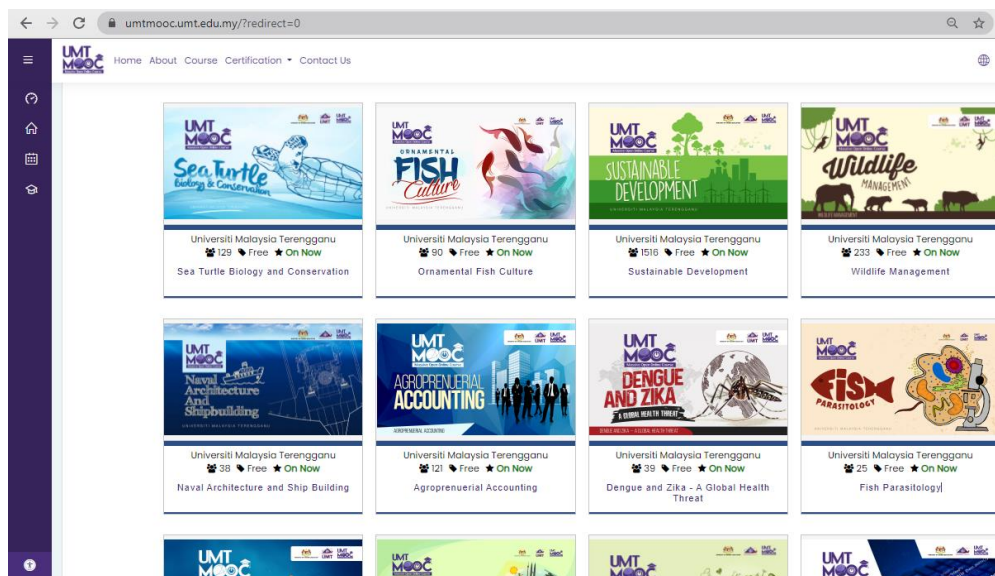

Figure 1: The UMTMOOC© Dashboard
https://umtmooc.umt.edu.my/

All UMTMOOC© courses are set to provide original content. Video recordings for each course were creatively recorded by the UMTMOOC Team and assisted by Subject Matter Experts (SMEs) at various locations such as fish farms, Chagar Hutang, mangrove swamps and Pulau Bidong (Marine Nature Station) UMT as well as many other locations. The video development process includes recording and editing using internal resources and expertise available at UMT. In addition, to ensure that the course is interactive and in a social learning environment, it is equipped with videos, notes, assessments and relevant teaching and learning activities. UMTMOOC© course content must emphasize the usage on teaching and learning items (PdP) that ensure students achieve outcomes learning. The selection of appropriate PdP elements includes materials, activities and assessment appropriate to the discipline of knowledge and the target student is necessary developed based on each predefined development component. Developed PdP items must be in digital form and use functionality appropriate within the selected platform. UMTMOOC© has developed 25 courses starting in 2015 until 2020 as shown in table 1 that have been built and started providing online.

Table 1 : UMTMOOC© Courses

	2015	2016	2017	2018	2019	2020
1)	Sustainable Development (PPAL)	Sea Turtle Biology & Conservation (SEATRU)	Agropreneurial Accounting (FPEPS)	Open Water Scuba Diver (Makmal Berpusat)	Coastal Sciences and Engineering (FSSM)	Philosophy of Management (FPEPS)
2)	Principles of Ecology (FSSM)	Environmental Management and Policy (FPEPS)	Wildlife Management (FSSM)	Estuarine and Mangrove Ecology (FSSM)	Occupational Health and Workplace Safety Program (FTKKI)	Olericulture (FPSM)
3)	Software Engineering (FTKKI)	Fish Parasitology (FPSM)	Dengue and Zika a Global Health Threat (FSSM)	Seed Production and Techniques (FPSM)	The Geography of Seaport System (FPM)	Biological Classification of Marine Organisms (FSSM)
4)	Naval Architechture and Shipbuilding (FTKKI)	Ornamental Fish Culture (FPSM)	Komunikasi Abad Ke-21 (PPAL)	Pastry and Bakery (FPSM)	Malaysia Tourism Industry (FPEPS)	Fundamental of Our Blue Planet (FSSM)
5)				Chemical Safety and Management (FSSM)		

Objectives of Innovation

Malaysia MOOCs is the first initiative in the world that brings together all first year students from 20 Malaysian public universities using one platform. It marks the first involvement by Malaysian public universities in MOOCs. Currently, all Public Universities, Community Colleges and some IPTS have offered MOOCs courses through the OpenLearning platform that can be followed by anyone regardless of age, educational background, gender, type of institution and so on. MOOCs benefit the Malaysian higher education system as MOOCs can increase student enrollment, improve the quality of teaching, internationalize Higher Education Institutions (IPT) and reduce the cost of delivering course content.

Instructors claimed that MOOC is a good learning tool for supporting distance learning and knowledge acquisition practices. The most frequent benefit mentioned by the instructors was the accessibility where MOOC is an online learning tool that facilitates flexible, self-paced, borderless and independent learning. Learners can be a lifelong learners and not bound to an institute for knowledge. This also helps in knowledge sharing between institutions as they can meet various and differently learning styles especially by learners who are "visual learners".

According to Norvig (2012), MOOCs had a remarkable ability to attract large numbers of learners to a vigorous online learning community as it can increase and improve quality of the learner experience by attract the attention of students. The constant availability makes MOOCs an excellent resource not only for students, but also for all life-long learners and modern professionals striving for on-going career development and personal improvement and enhance the overall learning experience. MOOCs always have been a great format to exchange ideas among participants, to study and develop creative processes and foster innovation. This is due to several factors, including the fact that participants in Massive Open Online Courses are usually very diverse.

The MOOC has exerted a significant influence on adult learning especially on higher education systems. The MOOCs has a direct impact on developing students' learning skills by giving a concrete example of real life, showing the relation of the subject to the real world. Thus, it can be concluded that with the help of e-learning system students can get easily the various study resources. The online nature of MOOC creates interest and motivation among the students. MOOC also seems to accommodate to the millennials' learning preference where accessibility of contents (notes, videos and forum), interactivity (formative assessment) and also the option to submit assignments online seem to satisfy their learning needs.

MOOCs providing open studies to everyone as MOOC is an online learning that is accessible to everyone all over the world. MOOCs give students the option of studying a subject in depth without the constraints of a traditional university course. They can be anywhere in the world as the resources are all online and they do not require previous qualifications. They are open to anyone, regardless of whether or not they have studied before. Flexible-learning can be understood as learning mode where teaching-learning are independent of any geographical location, time or pace.

Determinants of Successful UMTMOOC© COURSE

Increased student enrollment from within and outside the country

Education, previously thought to be a bastion of tradition, has lately experienced dramatic changes through the incorporation of digital technology. And introduces the use of eLearning and online courses to the traditional teaching and learning practice in the universities. In 2011, MOOCs reflected significant developing trends in education were introduced by several organizations such as Coursera, Udacity, and EDX. It sought to accomplish that goal by studying and building upon the previous experiences of others in this field, exchanging experiences with specialists and interested parties, and encouraging partnership and cooperation between the public and private sectors in the areas of e-learning and distance learning. Thus, it also provide an educational opportunity for anyone interested in studying any subject that they offering and "broadcasting" to global learners.

Introducing the "Niche" organization

Malaysia's initial approach to MOOCs does not entail similar goals as the aforementioned global examples. This has been emphasized in the proposed Malaysian Education Blueprint on Higher Education, which declares Malaysia's intent to leverage on MOOCs to highlight local expertise in niche areas and to use online learning to create a blended pedagogy at higher education institutions, rather than focusing on widespread global reach. As the introduction of MOOCs is a positive disruption towards modernizing higher education and encourage learners on how to learn with various tools and ICT and also increasing access to instructors skilled in specialized domains and niche subjects.

Collaboration with industry such as UMT's collaboration with DOSH for the "Occupational Health and Safety Workplace Program" course

The development of MOOCs is made possible by the online exchange of information by experts through social networking platforms. But the learner's collaboration in such courses is quite limited. It's just limited to consulting each other to ask questions and provide help. MOOC is available for learners when they are undecided on which course to commit for studying in college. This is because MOOC can give the student first-hand knowledge about the subject and increase new knowledge from different courses.

Knowledge transfer to the organization involved

Instructors claimed that MOOC is a good learning tool for supporting distance learning and knowledge acquisition practices. The most frequent benefit mentioned by the instructors was the accessibility where MOOC is an online learning tool that facilitates flexible, self-paced, borderless and independent learning. Learners can be lifelong learners and not bound to an institute for knowledge. This also helps in knowledge sharing between institutions as learners can learn from others through a social networking site.

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A-MOOC: AUGMENTING YOUR MOOC EXPERIENCE

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Highlights: Augmented Massive Open Online Course (A-MOOC) is an innovation in Massive Open Online Course (MOOC). A-MOOC augmenting the existing MOOC with three different learning techniques, which are Active Learning, Gamification and Augmented Reality. It also introduces the new concept of MOOC. In A-MOOC, learner can select their preferable learning environment, whether it is in an online or offline mode. The main challenge in MOOC is the low rate of course completion and high rate of curse dropout. This is due to poor content engagement that cause low level of motivation and accessibility issues to the course itself. Therefore, the main objective of A-MOOC is to improve MOOC content engagement order to increase learning motivation, which is hoped to reduce the number of learners dropout and increase the rate of MOOC completion. A-MOOC intent to increase the number of MOOC registration, support learner's retention and escalate MOOC completion. A-MOOC is empowering MOOC for the future of academic and society.

Key words: MOOC, Active Learning, Augmented Reality, Gamification, Learning Techniques, Learning Environment

Introduction

The use of Active Learning, Augmented Reality, and Gamification provides favorable environment for the learners that enhances learning outcomes by engaging them during the learning process. Stimulating the interaction among the learners, enabling interaction between real and virtual objects to provide better content visualization, and applying fun elements and aesthetics to learning environment are some of the key factors of these techniques.

This innovation project blends the three techniques together with MOOC content to provide an enriched environment. This enriched MOOC learning environment is knowns as Augmented MOOC (A-MOOC). A-MOOC demonstrate how these techniques were blend in an online and offline mode. The expectation with this amalgamation is to improve learner engagement that eventually motivate them to complete their learning in MOOC.

Motivation

There are still unsolved issues relating to MOOC and their effectiveness. Out of all the challenges, the incredibly low rate of course completion is one of the most troubling aspects. On average, only less than 10% of the learners complete the MOOCs they signed up for.

One of the identified reasons behind the scenario is due to low motivation. Therefore, better engagement techniques are required for motivating a learner to retain from sign up to course completion. This is for when learners are more motivated to learn, they are likely to better engage in learning and have a higher likelihood to complete a MOOC.

The main goal of A-MOOC is to improve student's engagement in MOOC. Therefore, three objectives have been set up to support the goal. The objectives are i) to enhancing MOOC by improving its content presentation techniques; ii) to examining Active Learning, Gamification and Augmented Reality techniques in MOOC; and iii) to demonstrate Self-Instructional Material (SIM) concept in MOOC to support ongoing learning process.

Augmented MOOC (A-MOOC)

The innovation focuses on the enhancement of MOOC by improving its content presentation techniques. Three techniques examined are Active Learning, Augmented Reality, and Gamification. These techniques have been adopted in various learning model and shown a remarkable impact on learners learning experience.

Active Learning promote idea of stimulating the interaction among the participants and promote their engagement. The Augmented Reality enables interaction with real and virtual objects. The better visualization of the content keeps learners active during the learning process as it enhances human ability to understand and process information. Gamification makes sure the learners are motivated to complete the task by applying fun game elements and aesthetics to learning environment. Augmented MOOC (A-MOOC) also demonstrate how MOOC can be implemented in an offline learning environment by embedding the Self-Instructional Material (SIM) concept as part of the main component in MOOC.
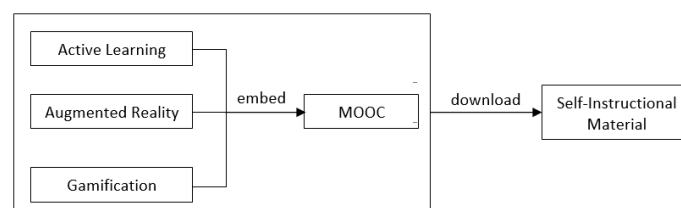

Figure 1: A-MOOC Structure

A-MOOC Novelty

The main strategy in A-MOOC is to incorporate different learning technologies and techniques which include QR3D-Code, Augmented Reality, Active Learning and Gamification techniques in MOOC. A-MOOC offers MOOC that can be used in online and offline mode.

In an online MOOC mode, A-MOOC provide more engaging activities with better visualization, support of individualism and improve learning interest factor, while in an offline mode, A-MOOC provide a downloadable and printable MOOC content and activities which turn into a Self-Instructional Materials in an offline mode to support an ongoing learning process.

A-MOOC Benefits

A-MOOC will be of great benefits to the following categories which include the MOOC instructors, developers, students, institutions, and community.

For MOOC instructors, A-MOOC provides a MOOC with rich content and activities that motivates learning. The MOOC developers will have a systematic guideline to design and develop a MOOC that can improve learner interactions and engagement. Students will enjoy the flexibility in learning at anytime, anywhere, and anyway. This will improve the number of MOOC enrolment and completion of an institution. Ultimately, there are more opportunities and options can be offered to community for their career and personal growth.

A-MOOC Commercial Value

Service Subsidization Model of Social Enterprise adapted by A-MOOC as the commercialization strategy. The proposed business canvas allows collaboration project with the respected teaching and learning unit. This will promote the role of the unit as the sole A-

MOOC concept training and educational services provider to the external marketplace such as other Higher Educational Institution and generate supplemental income to support the university academic and social programs

Table 1: Service Subsidization Model of Social Enterprise in A-MOOC

Steps	Stage	Deliverables
1	Idea	MOOC & Self-Instructional Materials (SIMs) development guidelines and policies.
2	Project	Self-instructional materials (SIM) template for HEIs.
3	Start-ups	Paid MOOC with certification (USD150 per course).
4	Business	Official MOOC and SIMs publication with authors and publishers.
5	Success	World leading MOOC developers and providers.

Conclusion

A-MOOC blends Active Learning, Augmented Reality, and Gamification techniques together with MOOC content to provide an enriched environment. It also demonstrates how MOOC can be accessible in an online and offline mode. The expectation with this amalgamation is to improve learner engagement that eventually motivate them to complete the course.

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ONE HEALTH

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Highlights: One Health is a massive open online course which introduces the participants to the concept of One Health in managing zoonotic diseases. One Health focuses on the interaction between human, animal and the environment in the management of diseases. The contents have been carefully selected and arranged in the order in which it will build on participants' understanding about One Health.

Key words: One Health, Zoonosis, Massive Open Online Course, Pandemic, Prevention, COVID19

Introduction

One Health is a collaborative, multisectoral, and trans-disciplinary approach - working at local, regional, national, and global levels - to achieve optimal health and well-being outcomes, recognizing the interconnections between people, animals, plants and their shared environment. The foundations of One Health are communication, coordination and collaboration among agencies involved in human, animal, environmental health and their other relevant partners. This massive open online course (MOOC) is created to disseminate the concept of One Health to the public and how they can contribute to the management and prevention of zoonotic diseases.

Content

MOOC is considered as a suitable resource for health education in developing countries for the general public (Liyanagunawardena & Aboshady, 2018). This MOOC is therefore created to educate the public about: i) the concept of One Health; ii) the One Health approach in managing common and emerging zoonotic diseases; iii) the measures to prevent zoonotic disease transmission; iv) the public health impacts of zoonotic diseases; and iv) the environmental aspects for control of zoonotic diseases.

In the designing of the MOOC, we have decided to utilise multiple educational technology application to ensure that the contents are engaging and applicable to different age groups. The topics selected have therefore, been carefully created and arranged in increasing order of complexity to allow participants from nonmedical background to understand the concept with ease. The topics were presented in a short, concise and colourful manner to grab participants attention (Guàrdia, Maina & Sangrà, 2013).

There are many benefits that the community can gain from this MOOC. The content of this MOOC is appropriate in educating the public about the current COVID19 pandemic as an example of zoonosis. It is relevant and timely and is applicable to other form of zoonosis too. The creation of educational videos was made to ease the participants understanding of the topic especially for visual learners. It is suitable for many age groups as the language use is easy to understand. The activities in the MOOC are suitable for individual or group activity. Children can challenge their parents on their understanding of the topic by taking the quizzes or playing with jigsaw puzzle.

We have used multiple apps and educational technology applications in creating this MOOC to make it more interactive and engaging. As participants go through this MOOC, they would have been introduced to and learned how to use these apps and technology applications for their own learning.

In terms of commercial values, the content of this MOOC can be repackaged as a learning module to educate students and the public about One Health and Zoonosis. The educational videos can be downloaded and used offline to teach communities with limited access to internet on the concept of One Health.

An example of the educational video is available on YouTube at https://youtu.be/0QObVr9uF3k

Figure 1: Example of the educational video

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BLENDED LEARNING TO REMOTE LEARNING: INSTRUCTIONAL DESIGN PERTINENT FOR EFFECTIVE ELEARNING

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Highlights: In its infancy stage, e-Learning was used widely in Distance Learning (DL). To overcome the pitfalls in this electronic dissemination of knowledge to Learners, the introduction of Blended Learning (BL) came into existence. BL has been advocated in Institution of Higher learning from 2004. Currently, the COVID-19 pandemic has transformed BL into Remote Learning (RL). Although the evolution of these e-Learning methods are in great pace, one thing that is pertinent is the Instructional Design (ID). The ID used in Face to Face (F2F) classroom setting has become very essential in RL. This paper highlights the importance of online ID in RL.

Key words: Online Instructional Design, Blended Learning, Remote Learning, e-Learning

Introduction

The amalgamation of Information and Communication Technology (ICT) with the Teaching and Learning (TnL) discipline gave birth to electronic Learning (e-Learning). The e-Learning mode is the rendition of TnL via digital resources. Traditional classroom TnL can be with or without a classroom but the embracing of electronic gadgets with network/internet connectivity forms an integral part of e-Learning. E-Learning enables the integration of technology in education. Figure 1 shows the evolution of course-delivery modalities using e-Learning in higher education. The integration of technology encouraged the promotion of diverse learning environment. This nurtures Learners engagement and interaction to learn new skills with comprehensive understanding of the subject matter in a new way, the millennials way of learning.
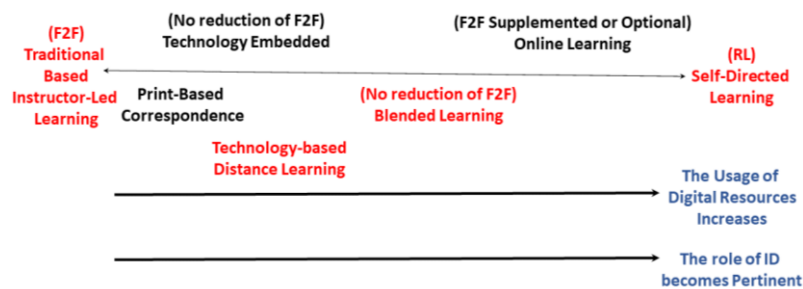
Figure 1: The evolution of course-delivery modalities in higher education.

E-Learning offers many advantages when properly executed. The e-Learning mode is synonymous with ubiquitous learning. The access to knowledge is at ease and self-paced in an e-Learning environment. E-Learning requires less manpower to run. On the other hand, there are pitfalls of e-Learning. Firstly, the lack of social interaction among learners and with instructors. The requirement of a learner with strong will, skillful plus the ability to manage time efficiently is required in e-Learning. Learners' communication skills is also impeded in e-Learning. Assessment via e-Learning requires many resources to enforce proctored versions. The implementation of e-Learning will be difficult in courses that requires hands-on activity. E-Learners will also be burdened with the cost of time and money. Although some of the

pitfalls can be overcome such as discussion forum for interaction and the cost effectiveness due to reduction in travelling, some disadvantages can only be minimized.

With the knowledge of the advantages of e-Learning and minimizing the effect of disadvantages, e-Learning gradually evolved to BL. Bunyarit (2006), reported that Institute of Higher Learning started to implement BL instead of solely being on traditional e-Learning. BL is a combination of traditional teacher-led classroom teaching and learning with the added elements of e-Learning (Haron, Abbas, & Abd Rahman, 2012). Concisely as defined by Graham & Harrison (2013), a learning system that combines face-to-face instruction with computer mediated instruction. It was known that BL offers more advantages compared to traditional e-Learning but academicians were apprehensive in adopting BL. The practice of BL in Institute of Higher Learning was progressing slowly but surely.

The COVID-19 pandemic has been the impetus for the sudden metamorphosis of BL into RL. The declaration of Novel Coronavirus (COVID-19) as a worldwide pandemic (Bahaeldin, 2020) has led to the Movement Control Order (MCO) in Malaysia (Bunyan, 2020; Jun, 2020; Sukumaran, 2020; Tang, 2020). The MCO forced TnL service providers to adopt and adapt new norm in TnL process. The learners together with the TnL service providers were challenged to accept the drastic change from face-to-face (F2F) classroom settings to RL (Ahmed, Allaf, & Elghazaly, 2020; Alsafi, Abbas, Hassan, & Ali, 2020). The switch has thus created an unparalleled instructional environment.

The F2F pedagogy requires Instructional design (ID) and today with the extensive use of RL (Ghazi-Saidi et al., 2020) in our daily TnL activity, ID has become pertinent. Is the widely used web based instruction of good quality? This evolution of modes of e-Learning has given birth to instructional technology. Today instructional technology is taking shape in the form of online ID. This paper will suggest the role of online ID in RL.

Content

The innovation highlighted in this work is regarding the importance of ID in ensuring a meaningful learning to happen when learners come online. The dissemination of knowledge started with Instructor-led learning and today we have moved on to RL where self-directed learning plays an essential role. Although this transition is a forced move due to COVID-19, we as TnL service providers need to adopt and adapt the important instructional factors like pedagogy and course design in our online ID. For this purpose, this paper suggests the use of carefully constructed online ID. The design includes and focuses on three pertinent area of online learning, they are micro-learning, personalized e-learning and accessible assessments (Table 1).

Table 1: Key elements of Online Instructional Design (online ID)

Elements	Functionality
Micro Learning	Creation of learning content in a byte-size learning manner.
Personalised Learning	Ubiquitous leaning opportunity endowed to learners enabling absorption, recalling and retention of knowledge effectively.
Accessible Assessment	Self-directed assessment and practise ensuring learner's power of knowledge retention.

The current online instruction observed in many online courses have some flaws that may have been overlooked due to some reasons. The creators of online courses are producing a simple conversion of their equivalent F2F class. We must realize that the primary goal of online learning is not only to disseminate knowledge from instructor to students but to create most effective and innovative instructional strategies to engage learners in a meaningful way.

Due to the current COVID-19 pandemic, the goal of education is to keep providing learning opportunities to learners by restricting the social contact among instructors-students and student-student F2F interactions. The learning opportunities provided are in the form of varied digital learning resources. Upon acquiring these resources learners are expected to demonstrate their learning in various assessment modalities. This current education model in the institution of higher learning is important to be scrutinize because the future workforce will be trained in this fashion. This paper advocates the way how to dissemination the digital learning resources to the learners in an effective and innovative way using the online ID suggested.

The online ID suggested in this work is simple yet it encompasses key elements that are integral for online learning to happen. The other advantages of this approach is that it can be adopted in all disciplines and any cohort of learners. As reiterated earlier one of the flaws of many current online courses is reproducing F2F approach. In an example, a one-hour lecture in a traditional TnL doesn't equate to an hour video recording in an online course setting. Instead, key points of the lecture need to be addressed in a byte-size manner using micro learning approaches. Followed by making it available in learning management system for 24/7 accessibility. Finally allowing the students to be able to do self-directed assessment for learning.

The design of the online courses based on this online ID can be applied to all disciplines, this ensures the marketability of this product. The content expert in the particular discipline needs to understand the pedagogy and course design in order to appreciate the online ID.

In conclusion the COVID-19 pandemic has brought about a significant alteration in our current education landscape and the TnL fraternity has accepted the challenge by going remote learning. We have implemented full online learning methodology and due to this we have to ensure the quality of knowledge dissemination in this mode. This paper proposes a simple yet comprehensive online instructional design to make remote learning more meaningful to learners.

Acknowledgement

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HATI BUDDY LAND: MAZE RUNNER + MICROLEARNING. ENHANCING KNOWLEDGE AND AWARENESS OF BULLYING AMONGST STUDENTS

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Highlights: Abstract: Hati Buddy Land is a maze runner board game + microlearning that aims to address school bullying. Students' knowledge and awareness of bullying are enhanced by combining this game-based learning and micro-learning videos on a website. This approach is implemented using QR code technology. In this game, students who successfully overcome the challenge (questions via QR code) to reach the destination will be the winner. The QR code contains microlearning videos on bullying knowledge and awareness. Rewards and penalties are used for fun learning purposes. Indirectly this game is able to address the issue of bullying in schools.

Keywords: Hati Buddy Land, Maze Runner, Game-Based Learning, Microlearning, Bullying behavior.

Introduction

Bullying among school children is a global phenomenon that is increasingly serious, especially when it involves student death cases. Among the factors of bullying in school is the low level of bullying knowledge among students. This is due to there is no syllabus-related bullying in school to learn formally. This leads to poses of misconceptions about bullying. Low levels of knowledge about bullying behavior are significantly associated with levels of bullying behavior (Jamalsafri, 2017).

Hati Buddy Land: Maze runner + Microlearning is one of the game modules of *2B's* Program: I'm a buddy, not a bully. This game is an original idea developed to address the issue of bullying, which is one of the issues of national education nowadays. This is done by increasing the knowledge and awareness of bullying among school children. This game has been developed based on learning theories and applying game-based learning methods because of its suitability with the target group of primary school children.

Content

The 'Heart Buddy Land' game: Maze runner + Microlearning aims to increase knowledge and awareness about bullying among students in school. For this purpose, knowledge, and awareness of bullying are disseminated to students through a combination of game-based learning approach with microlearning. A combination of these approaches is implemented using QR code technology. Maze runner board game is used as a game while video description of bullying awareness and knowledge is used in microlearning. On the other hand, an avatar is used as narrator characters and convey knowledge and awareness of bullying.

The 'Heart Buddy Land' game: Maze runner + Microlearning was developed due to a combination of several learning theories, namely Constructivist Social Theory (Vygotsky, 1962) and Multiple Intelligences Theory (Gardner 1983). The three assumptions of Constructivist Social Theory are:

i) Knowledge is the result of human interaction.

ii) Knowledge is socially and culturally constructed and influenced by the group and its environment.

iii) Learning is a social activity.

Based on those assumptions, this game design applies these theoretical features to the game. The Theory of Multiple Intelligences (Gardner, 1983) explains that intelligence is the ability to solve problems or even create products that are valued by a culture. Every child has a different intelligence. Each intelligence needs to be assessed equally and equally weighted. Children's intelligence can be enhanced through educational opportunities such as providing an environment rich in fun materials and activities.

This game developed using the ASSURE Model (Gagne, 1985). The ASSURE model is a classroom-based lesson plan model. By emphasizing student-centered strategies, elements of cooperative and collaborative learning have been used. This learning also has a problem-solving element in the form of a game narrative. Meanwhile, video microlearning has been applied to strengthen students' knowledge and awareness of bullying. While there's no official microlearning definition, all microlearning shares one key characteristic: brevity. This could either be small learning units or short-term learning activities related knowledge and awareness about bullying. Microlearning puts knowledge in small and understandable fractions. Therefore, microlearning methods can provide the students with the required knowledge and skills they need as they discover a path in their individual life especially how to deal with the bully at school. [30].

Mastery of 21st-century skills is an essential element in developing this game as these skills are the basic skills of the 4.0 industrial revolution. Thus, the game has applied aspects such as problem-solving skills, communication skills, critical and creative thinking skills, and emphasizing digital age literacy skills through a combination of microlearning methods, inventive thinking, effective communication, and spiritual norms and values that need to master by students.

This game-based learning has clearly had an impact on the achievement of planned learning outcomes. To identify the effect of this game (game-based learning) versus the talk method, a quasi-experiment was conducted. ANCOVA analysis found that there was a significant effect of the study group on post-test scores. After differences in pre-controlled tests, the treatment group (GBL) showed a higher mean score than the control group (talk). This indicates that The *Hati* Buddy Land: Maze runner + Microlearning has positively impacted students' knowledge and awareness.

This game has a lot of usefulness. It can increase knowledge about bullying to students and can be used as a guide for counselors, teachers, and wardens to deal with bullying in schools. In addition, it can be used as a training module for future teachers and the ministry to develop a comprehensive program to address bullying. This project is indeed very scalable against the application to different fields. If developing modules for other fields is implemented correctly, no issues will arise, even for other fields. The only difference is the teaching content, but the teaching design can adapt according to the demographics of the students.

The Heart Buddy Land: Maze runner + Microlearning can benefit from cost savings because it can be implemented in various packages such as TOT for trained coaches/teachers/counselors. This game-based learning + microlearning is easy for teachers to develop if proper training is done. The game used can be developed using waste materials such as boxes, bottles of mineral water, and others according to the teacher's creativity. If the material is designed with good quality, it can be reused as it is not disposable and disposable. With a good package, this game can also be upgraded online (mobile app) by using gamification learning that is suitable for mobile learning.

The Ministry of Education should also take this opportunity to apply this game in primary and secondary schools. With the theme 'Buddy's Heart,' this transformation can address bullying, which is one of the national issues today. Teaching about bullying behavior is focused in schools and needs to be developed specially by parents and the community to educate the nation's children to be a 'Buddy's Heart.'

Acknowledgment

Achievement and award

'2B's Program: I'm a buddy, not a bully' has received several international and local awards based on the modules and games that have been developed, including the game 'The Heart Buddy Land: Maze runner + Microlearning.'

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2. Anugerah Sanggar Sangjung, USM 2013, kategori kualiti.
3. Publication - Scopus Index - Malaysian Journal of Learning and Instruction (MJLI),
4. Trademark in Malaysia. registration: 2014001647
5. Copyright: AR2019004284 (Hati Buddy Land Maze Runner) 2019
6. Bullying Knowledge Development Module- 2Bs Program: I'm A Buddy Not A Bully, International Inversity Carnival On E-Learning IUCEL 2018, (Gold Medal) Invention, Innovation And Desgin On E-Learning (IIEDEL), 2018 (International)
7. Hati Buddy: Micro+puzzle Learning. IUCEL 2019 - Gold Medal, MEIPTA 2019, International University Carnival On E-Learning, 2019 (International)
8. 'The Enhancement of Knowledge on Bully - 2BS Program: I'm A Buddy Not A Bully – (Silver medal), International Federation Of Inventor Associations, International Invention , Innovation & Technology Exhibition, Malaysia- ITEX, (2019) (International)

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Stimulating Students' Self and Peer Assessment by Incorporating e-Quiz and a Strategy Game in a Gamified Mobile Application

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Highlights: Self and peer assessment introduces the concept of students assessing each other and themselves which encourages students to engage with the assessment criteria and reflection of their own performance and that of their peers. Online quiz (e-quiz) is one of ongoing structured formative learning which give students immediate feedback on their performance. Kingdom Quizzes (KQ) is a combination of an e-quiz and a strategy game in a mobile application, developed to serve as an assisting tool for educator and student to engage in a fun learning environment as well promoting self and peer assessment on students. KQ focus on the 'reward' element in which the marks and rank that the student's gained in the quiz session will reward them with various 'item' in their game inventory. This creates 'motivation' in students to do well in their quizzes which generate engagement in the classroom (physically or virtually), hence 'continuance intention' to use the application.

Key words: *gamified e-quiz, strategy game, learning tool, android mobile application*

1. Introduction

The effect that quizzes and tests can improve student learning is known as the testing effect (Rowland, 2014). Similar terms include "retrieval practice" or "test-enhanced learning", which refer to the increased retention of learned knowledge and/or skills by retrieving material through testing (Larsen, 2013). Educational applications are a popular choice of learning and teaching tools in recent years, while gamification has become an educational approach that is able to facilitate learning, encourage motivation and engagement, improve learner participation and lesson interactivity. Current growing research suggesting that gamification is being accepted as an effective learning strategy used to create highly engaging learning experiences (Zainuddin et al., 2020). Empirical evidence of recent studies proved the success of digital games in education has sought to validate the effects of gamification in support of its potential to improve motivation, engagement and social influence while allowing the students to immerse in experiential learning (Groening & Binnewies, 2019; Lopez & Tucker, 2019). Common problem in students who take courses in schools or universities, is the lack of motivation and engagement (Adukaite et al., 2017; Çakıroğlu et al., 2017). In university setting, these problems will affect the student's final

grade, retention of material, and the course dropout rate. The absence of student motivation and engagement cannot be solved by traditional strategies. (Bouwmeester et al., 2019; Lo & Hew, 2018; Ortiz-Rojas et al., 2019). On the other hand, 'intelligent games' can contribute to students recognizing their abilities and potentials in their individual works and group works. This will also develop and enhance self-esteem, gain systematic and disciplined study habits for success and students will develop the attitudes and behaviors of creating alternative solutions and strategies fearlessly in case of failure. Mental development is relevant to comprehend and keep information which can be achieved through 'play' such as commenting abilities, decision making, thinking and evaluation. Criteria in successful planning in game playing involves attention, perception and thinking. Many cognitive abilities evolved while the children are playing for instance; memory, strategy, decision making, observation, spatial reasoning, and problem solving. When a person experiencing learning problem, starts the work while performing an activity relevant to learning in order to direct mental energy towards that activity during the activity and to resist to surrounding distracters, that is call 'increasing the attention' (Yeşiltepe and Altintas, 2016).

Apart from gamified quiz application highlighted the 'testing effect' or 'retrieval practice' concept, it also introduced 'self and peer assessment' concept because most of the gamified applications possess the mechanism of 'leaderboard' (e.g. Quizziz, Quizlet, Quizmaker, Kingdom Quizzes). 'Self and peer assessment' basically means that the students are assessing each other and also themselves. This can encourage students to take greater responsibility for their learning, for instance encouraging engagement with assessment criteria and reflection of their own performance and that of their peers. By doing so, students can learn from their previous mistakes, identify their strengths and weaknesses and learn to target their learning accordingly. As the 'leaderboard' act as a 'list' that displays the player or students' performance and rank, hence a gamified e-quiz application can also be considered as a 'self and peer assessment' tool. Landers & Landers, (2014) explored impact of 'leaderboards' which involves game elements such as conflict/challenge, rules/goals, and assessment towards student's interaction and achievement. In Sanchez et al., 2020 research, they applied gamification on an online quiz (e-quiz) module that was already embedded in an online learning management system (LMS) which discovered that students engage in more preparational quizzes when game elements are added, and the research provided the instructors with insights on the potential effects of gamification within the setting of 'self and peer assessment' module or tool. There is a vast selection of 'self and peer assessment' tools nowadays, which offers the users functions and features that can suit their requirement and preferences. However, the effectiveness of the 'self and peer assessment' tool depends on the design of the gamified system (Dimitriadou, 2017). Werbach & Hunter (2015) proposed the implementation of 'Hedonic Treadmill' phenomenon which refers to the design of gamification that focuses on rewards as the main source of 'pleasure'. This means that the game designers will need to keep providing more frequent and bigger rewards in order to maintain the player's motivation. When online applications are applied in the teaching and learning session, educators are faced with low participation by the students such as formative quizzes. Current 'self and peer assessment' tool lack enticing element to retain student's usage and interest. This also contributes to the educator low motivation on pursuing the tool usage. Thus, the 'discontinuance' of the tool will then take place.

2.0 Innovation

Kingdom Quizzes (KQ) is a gamified e-quiz that incorporates reward ranking system that is combine with a strategy game. KQ embedded 'leaderboard' mechanism in the quiz

module to encourage self and peer assessment as well as to contribute 'virtual reward' to the players that can later be utilized in the next module (game module). This is one of the ways to entice or motivate the students to continue using KQ, in which the students are required to get 'good ranking' (excel in the quiz session) in order to gain useful rewards (20 coins, 10 coins, life and 5 coins) to help them win the strategy game (tower defense game) that is embedded in KQ. KQ possesses a strategy game to create the student engagement and enthusiasm based on the concept of 'Hedonic Treadmill' in a game system that focuses on rewards as the main source of 'pleasure'. This android mobile application was published on October 2020 in Google Play Store and has received MyIPO copyright number CRLY00026552. Through this application, any course or subject can be made as the content of the quiz (customizable) and any student is able to answer or join the quiz, provided that they inserted the correct course code. KQ can be used by students and educator (teacher, lecturer) from primary, secondary to higher institutions regardless of public or private educational institutes. KQ offers two types of account, (i) educator and (ii)student as well as two modules which are (i)quiz module and (ii)game module. Each set of quiz created may contain 40 objective questions. The creation of a quiz can only be done through the educator's account and will be charge RM4.49 (USD1.09) per set. On the other hand, the student will not be charge upon using the application whether it is the quiz module or the game module. Both modules are interconnected through the 'reward' system in which the ranking or achievement that the student gained in the quiz module will reflect the type of reward they will get and able to be utilized later in the game module. After the execution of quiz in KQ, students are still able to interact with the product through both modules. The scores or data on previous usage are kept which means the user may review the previously done quizzes as revision as well as continuing the game play of the tower defense game in KQ. The more quiz and reward the students gained, the more coins or life will be populated in the game inventory for future usage. All these features contributed to the students' engagement, encouraged self and peer assessment, hence the motivation to do well in quiz session.

3.0 Product Development

KQ adopts ADDIE model for the development methodology where each phase in ADDIE lets developers set the pace of work while carrying out the construction process. ADDIE stands for Analysis, Design, Development, Implementation and Evaluation. All these processes took about 2 years to be completed.

3.1 Analysis Phase

In this phase, the process of analyzing requirements based on the types of game preferred by students was carried out. Based on observation, current trends, as well as verbal feedback from students themselves, a 'strategy game concept' is much more preferable by not only teenagers but also children in primary school. The software/product requirement for KQ was also gathered from a public primary school, SK Kampong Raja, Pagoh, Johor apart from the Diploma of IT, UTHM. The maximum number of questions that can be inserted by educator in each set of question is also based on the number of questions for UPSR (Malaysian examination for standard 6 primary school) Mathematics paper. In addition, some other analyses such as the analysis of potential users and the analysis of the learning environment were also carried out.

3.2 Design Phase

The whole view regarding the theme of the product, structure, gamification elements, types of game and technology were confirmed after the analysis phase. The flow or design of the product was revised, in which the theme of 'Medieval Age' and 'Kingdom' concept was chosen. KQ was design based on the concept of 'reward motivation', thus the developer decided to divide the activities into two parts that are correlated with each other through the 'reward' element; (i) answering part (quiz section) and (ii) game playing part (game section). The quiz reward is defined by 'ranking' achieved by the player displayed on the 'leaderboard'. Apart from the leaderboard being the tool for evaluation of students' performance, it will also indicate the type of reward that will be populated in the game module 'inventory'. Depending on the ranking, player will receive item such as 'Live' or 'Coin' (e.g. 20 coins for rank 1-5, 10 coins for rank 6-15, life for rank 16-30 and 5 coins for ranking more than 29) that they may choose to use in their Tower Defense (Strategy) game later.

3.3   Development Phase

In the development phase, the application was developed using C# programming language in the Unity 3D as well as incorporating Firebase Realtime Database that stores and sync data 'real time' to store the questions and answers for the quiz section. The architecture of KQ is being displayed in Figure 1. It involves authentication of users, which are the educator and student. The game section was firstly developed, followed by the database, login and quiz section. Lastly, the connection between quiz section to the game section was constructed in which involves 'reward' concept resulting from answering quiz that contributed to the inventory of the gameplay.

3.4   Implementation Phase

The implementation phase aims to make sure that this application is built to meet the objective and is suitable for the usage of the targeted users. This way, problems can be identified which were not realized during the design phase and during development. This phase has produced a complete functional application for the educator module and student module. The educator module presents educator with e-quiz function that has to be purchased with the price of RM4.49 ($1.49) per course. Any students can choose to perform the quiz provided that they insert or choose the course id. The record of quiz that was answered will be kept in the database for future revision by students. The ranking and result that the student gained after each quiz session will contribute to the game session through inventory system. Player may choose which weapon in their inventory system that they wish to use in the game session. This means that the better rank that the student gets in the quiz session, the higher chance of winning the tower defense game that they will experience. This is due to the accumulated weapon and item they had gained for selection in their inventory system. There are 3 levels in the game which adopts 'Medieval Age' theme where the player has to defend the 'Kingdom' from enemies (trolls, giants, wild animals, flying enemies) by selecting the type of defender object (archer, cannon, wizard) in each tower station. The objective is to prevent the enemies from passing through the last fort (tower).

Fig. 1. The architecture of KQ.

3.5   Evaluation Phase

In this evaluation phase, the study made (i) comparison between the functions and features of other gamified e-quiz applications such as Kahoot! and Quizizz with KQ and (ii) conducting Integration Testing and Module Testing towards KQ as it involved network connection, cloud database as well as purchasing module (in Google Play Store). This is to ensure that the product developed fulfils the objectives and is free from defects or bugs. The elements that were compared between the three gamified e-quiz applications are as follows; Internet connection/network support, cloud storage, leaderboard/ ranking, revision function for students (quizzes that were published by their educator), progressive game (embedded inside the application) and 'Reward System' that is interconnected with the game module. Kingdom Quizzes (KQ) possess all these elements, while Quizizz lacks progressive game (embedded inside the application) and 'Reward System' that is interconnected with the game module and Kahoot! lacks revision function for students (quizzes that were published by their educator), progressive game (embedded inside the application) and 'Reward System' that is interconnected with the game module.

4.0 Result and Discussion

User Acceptance Testing (UAT) had been done amongst UTHM Diploma of IT students (first year student) in November 2020 with the participation of 142 students. Using Google Form surveys, responses were collected and the result showed that more than 88.72% (out of 142 responses) participants/users expressed interest in further usage of KQ with other subjects. Summary of responses are listed in Table 1 which indicates the students' interest in self and peer assessment using this product. The ranking in the 'leaderboard' does not

only represent students' performance, it also represents the type of virtual reward (coin and life) that the students will acquire to be populated in their strategy game inventory (game module).

Table 1. Google Form surveys' responses on KQ

Question	Percentage % (142 responses)
Continuance use intention in KQ	88.72
Useful 'leaderboard' display	91.5
Preparation for quiz before KQ usage	93.7
Increase student's motivation to perform better	93.7
Useful 'revision' function for self-improvement	98.6

5.0 Advantages of Innovation

The importance of KQ to education are; (i) as a 'portable' medium of learning in the form of a 'quiz' adventure game using mobile devices, (ii) enhances the engagement in learning and teaching inside and outside of the classroom which take place effectively through combining multimedia elements and (iii) transform paper-based test/quiz into electronic quiz (e-quiz) on android mobile (popular medium).

6.0 Importance to Education

Based on the result gathered, the advantage of KQ was being highlighted as an engaging gamified e-quiz mobile application by incorporating strategy game with students' quiz performance. Positive responses on the usefulness of the gamification functions embedded in this product has increase the motivation in learning amongst the students (users). The reward element based on ranking on the leaderboard has manage to create 'continuance use intention' in KQ. The application can help the students perform e-quiz and revision in an interesting way, ease the educator's work and also enhance the quality of teaching and learning. Students are known to be competitive especially when playing, thus this product hope is to instilled the enthusiasm amongst the students to perform e-quizzes while having fun. As KQ is in English while the questions are based on the educator's preferred language (stored in database), thus it is user friendly and may be used by other country apart from Malaysia.

7.0 Commercial Value

KQ has been published on Google Play Store for free download, however it has 'In App Purchase' for educator for the purpose of creating a quiz set (40 questions). There is no limit to numbers of students that can add the course code (answer the quiz set). As KQ is in English while the questions are based on the educators' preferred language (stored in database), thus it is user friendly and may be used by other country apart from Malaysia.

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