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UNIVERSITI TEKNOLOGI MALAYSIA

NEW ACADEMIA LEARNING INNOVATION

NALI2020

Future Ready Educators

7-10 December 2020

PROCEEDING

NEW ACADEMIA LEARNING INNOVATION (NALI) 2020

Exhibition & Competition 2020

PROCEEDING OF NEW ACADEMIA LEARNING INNOVATION (NALI) 2020 EXHIBITION & COMPETITION

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FOREWORD FROM CHAIR OF NALI 2020

Assalamualaikum Warahmatullahi Wabarakatuh and Greetings.

It is with deep appreciation that I write this Foreword to the Proceedings of NALI 2020. This year is a special edition of the NALI as we face a new frontier in transforming our previous success from a physical event to a virtual one. The extraordinary challenges created by the global pandemic has provided us with an opportunity to leverage technology and allowed us to reach a far larger audience. The theme of 'Future Ready Educators' is timely as the New Academia Learning Innovation or the NALI framework was established in UTM to provide the necessary platform to build a learning and teaching ecosystem for future ready educators.

The NALI framework opens up opportunities for educators to use innovations such as mobile computing, cloud, social network and big data to build a learning ecosystem in preparing students for a globally connected and technology fuelled-world. NALI 2020 was organised to provide a platform to showcase and celebrate innovative and transformative practice, research and products in learning and teaching in line with Education 4.0 and the promotion of STEM Education. NALI 2020 also aims to recognise excellence in innovative learning and teaching through the NALI Award.

Technology and other changes in society demand innovation in education. While we may face many challenges as in the current pandemic situation, education stands to benefit the most from both utilising and teaching innovation. By exploring new and better ways to educate students and also teaching the skills students need to become innovators themselves, today's educators can have a tremendous impact on the future of our world.

NALI 2020 featured an impressive line-up of renowned speakers in Malaysia and in the international education arena in the Keynote, Plenary, Forum and Workshop sessions that were held from 07 December to 10 December 2020. On that note, we wish to extend our greatest appreciation and gratitude to our esteemed speakers as their valuable contributions were instrumental in the successful delivery of this virtual event. It is hoped that the NALI event will continue to be an impetus towards further exciting innovations in learning and teaching as we prepare our graduates for a future filled with rapid technological changes.

On behalf of the organising committee of NALI 2020, I thank all participants for their contributions and heartiest congratulations to all medal winners and award recipients.

Thank you.

Associate Prof. Ir. Dr. Hayati Abdullah
Chair
New Academia Learning Innovation (NALI) 2020

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Developing Trainers' Skills Through the Use of Mixed NALI Strategies and Experiential learning approach

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Highlights: The implementation of a mixed of new academia teaching and learning strategies in MHAR 1043 aims to produce graduates who will have the competencies in planning, designing, and evaluating training programs. A teaching model was developed using mixed of experiential learning approaches consisting of four types of new academia teaching and learning strategies, namely peer instruction, problem-based learning, project-based learning, and service learning. Reflections from students were analysed to determine the effectiveness of the teaching model. The data and final students' grades suggest that the teaching model has improved students' knowledge, skills, and abilities in conducting training program. The module developed in this course could be copyrighted and commercialized. In conclusion, this teaching model is effective and could be applied to other HRD related courses.

Key words: experiential learning; peer instruction; problem-based learning; project-based learning; service learning

Introduction

One of the programmes offered by the School of Human Resource Development and Psychology in University Technology of Malaysia (UTM) is Master of Human Resource Development. This programme is designed to produce graduates in the field of human resource development (HRD) that, among others, possess the capability to design, implement, and evaluate organizational HRD programmes. Although there are various definitions for HRD (Nolan & Garavan, 2015) there is a consensus among researchers and practitioners alike that HRD is important to produce quality human resources, as well as to achieve competitive advantage (Aragón-Sánchez et al., 2003; Scheel et al., 2014). In order to achieve these, HRD practitioners specifically training managers are required to possess the competencies for various training related roles including managing training department, developing training strategies, organizing training programs, and delivering training materials (Wong & Lee, 2017). However, previously, students were seen to be struggling with the MHAR 1043 (Human Resource Development Planning, Design, and Evaluation) course as the topics are quite challenging. To overcome this issue and improve students' learning, we decided to improve the teaching and learning strategies used in this course. With that objective in mind, the teaching and learning strategies for the course were designed based on the experiential learning approach, with some improvement and adjustment on the strategies being used. Through this approach, students get to immediately apply knowledge to solve real problem. This approach also enables students to learn hands-on, improves their understanding and retention of knowledge.

Experiential Learning Approach

Based on Kolb's experiential learning theory (Kolb 1984), experiential learning involves four phases namely concrete experience, reflective observation, abstract conceptualization and active experimentation. This four-stage learning cycle was utilised in the group project through (1) concrete experience, whereby students gain experience through the process of assessing actual training needs (TNA) of a specified target population using survey and interview, (2) reflection and observation, whereby students reflect and review on the findings from the TNA process before deciding on the types of training, the training objective, as well as the training content, (3) abstract conceptualisation, whereby students begin to design the training module which includes the lesson plan, materials such as slides, evaluation sheets, activities etc. based on the information gathered from the first stage, (4) active experimentation, whereby students conduct the planned training program towards the targeted audience identified at the earlier stage. The students are also required to evaluate the effectiveness of the training program that they conducted followed by a reflection of their achievements as well as areas for improvement.

NALI approach implemented in the Teaching and Learning Strategies

The course has incorporated four types of new academia teaching and learning strategies, namely peer instruction, problem-based learning, project-based learning, and service learning within the experiential learning approach. According to Basar et. al (2019) and Rasid et al (2019) peer instruction is a student-centered learning approach which is not only interactive but also allows students to gain knowledge and improve understanding through class activities such as group discussion, peer study, desk research, and class presentation. For this course, the students were first asked to form groups, whereby each group is required to conduct a review of articles based on a given topic followed by a presentation of their compilation of findings to the class. This learning strategy is not only important to break the ice among members in the groups but also to allow the students to learn collaboratively – an important criterion for the subsequent group project.

Problem based learning on the other hand allows for collaborative learning (Atan & Rosli, 2019) which indirectly contributes to the successful implementation of the group project (project-based learning). This strategy is also

believed to improve students problem-solving skills (Shukery & Ismail, 2019). In the context of this course, the students were required to assess the problem in the target population and then decide on which problem they intent to solve through their training programme. Last but not least, the course also incorporated service learning as part of the teaching and learning strategies as service learning is said to help students develop their soft skills, become active learners, improve their creative problem-solving skills, as well as team working skills (Munisamy et al, 2019).

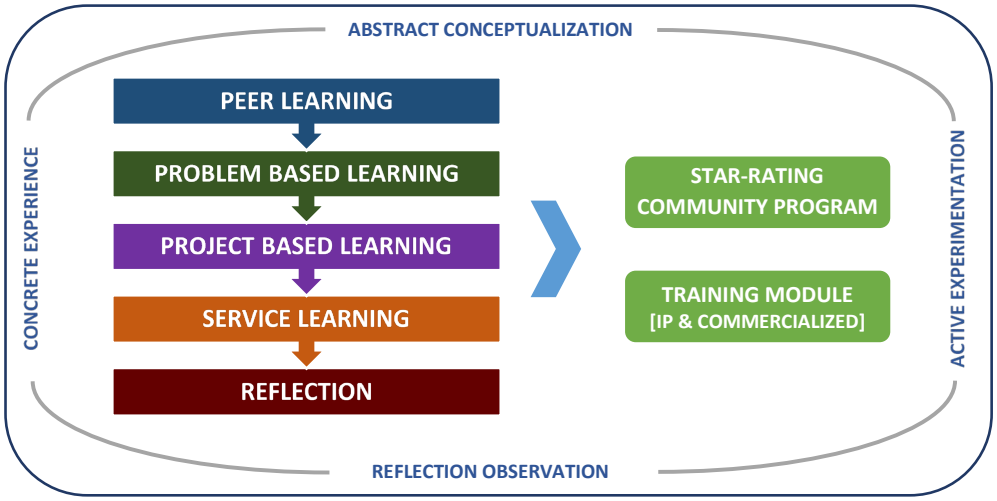

Figure 1: Teaching model using mixed NALI approaches

Research Methodology

The course was conducted 3 hours every week for 14 consecutive weeks. A number of 19 Master of Human Resources Development students were involved in the class. The course was divided into three phases. In the first phase of the class, students were asked to do the peer learning. In which, students were divided into groups, and each group will present and conduct a teaching and learning activity on one topic to their peers. In the second phase, students were asked to prepare a module. The students were asked to conduct a need analysis on a group of participants at an institution in Johor Bahru to gather the training needed by the participants. The students then design and develop a training module that is related to the needs addressed earlier. In the third phase, students were asked to conduct a service-learning project, that is by implementing the designed training at the institution. Evaluation were conducted on the participants before and after the training session. Data from the evaluation process were analyzed to evaluate the effectiveness of the training. Besides that, some interviews were conducted to strengthen the findings. Report on the service learning were submitted by the students. At the end of class, students were asked to write a reflection on their learning experience in this course.

Finding and discussion of the research

Students' reflection was collected. Table 1 shows some of the students' responses.

Table 1: Sample of Student's Reflection on the Experiential Learning Approach Used

Students	Excerpt from Students' Reflection
S01	"The teaching and assignments help me to understand about HRD more than before."
S02	"For mock training activity, honestly, this is one of my favorite activities in this subject because I can understand the process to make the training program, and how I must design the program properly."
S04	"I get the crucial things about ADIE from my friends' presentations and be clearer when Dr Halimah explain it at last session. I get the information about the step in the HRD process and how to implement HRD effectively."
S05	"the interesting thing about learning this subject is I am able to learn the content of the training module. Dr. Halimah's assignment is vital knowledge for me as I know in future, whenever I work in the Human Resource field, there is time I will have to conduct a training. Hence, from the assignment I can see the flow of the training program and how to conduct planning, design and evaluate the training."
S07	"I like it when I have to present a topic because it helps me to understand better when I teach others"
S09	"Before I enter this class, my understanding about HRD was very limited. After I took this class, I discovered that there are more specific methods that I can use and explain HRD. What I learned in this class is that I know the true process of organizing a training program and it is very useful when I return to my organization."
S10	"The module development was very good experience for me as "I now really know how to design and develop a training module and very helpful for my current job."

S11	"This class give me a wonderful chance to gain a lot of knowledge about HRPDE. The end of this class I'm very grateful to learn through presentation and projects. I'm very thankful for Dr Halimah and Dr Husna as they try do their best to explain to us everything about HRD to try to make our assignment as useful as they can."
S12	"The most helpful assignment that makes me understand a lot better are presentation session followed by the module development. In a nutshell, everything would be easier if the teachers put full efforts towards the teaching."
S17	"I thought it would be the toughest subject for this semester due to many course works including project but with the full support from Dr Halimah and Dr Rabeatul, all the assignments have been done a lot easier because both of them have guided us until we can fully understand what we actually should do. The assignments help me learn many things about HRD."

Findings showed that the mixed of NALI teaching and learning approaches used in this course helps the students' learning and understanding as well as developed their training skills. The practical aspects of developing a training module and conducting a training based on the module really help to improve students' understanding and skills on developing a good training. This assists the students to become a good trainer in the future and would help them in their career. The service-learning program was able to provide some contribution to the society involved. Besides that, all the modules developed by the students will be submitted for Intellectual Properties (IP) and could be marketable in the future. Additionally, all the training modules developed could contribute to many as it provided a series of training on various soft skills that are needed to develop efficient human resources in the organization. Aside from that, the students' grades showed significant improvement compared to the previous semesters.

Conclusion

As a conclusion, the uniqueness of the implementation of the teaching model based on mixed of experiential learning approaches in this course is that it consists of the mixed of four types of NALI teaching and learning strategies, that is peer instruction, problem-based learning, project-based learning, and service learning. Through these mixed strategies, the students showed improved understanding and response on the topics being taught in this course compared to the previous semester teaching methods. Furthermore, an impactful star-rating service-learning program was conducted through this course that is beneficial to the society. More importantly, the product, that is the module developed from this course could be commercialized and might benefit the Malaysian HRD platform.

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Innovative Chemical Plant Design Capstone Project

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Highlights: Chemical Plant Capstone Design Project is a compulsory element in chemical engineering programmes in the country. Capstone project is also one of the High Impact Educational Practices stated in New Academia Learning Innovation. In the Universiti Teknologi Malaysia, the capstone design project is structured as two sequential courses: Chemical Process Design and Chemical Plant Design Project. Since 2017, the two courses have been revamped and improved in three areas, which includes a) integration of teaching, learning and assessment through cooperative and project-based Learning; b) holistic assessment drives the development of holistic graduates; and c) comprehensive Industrial Exposure to meet future employer expectations. The revamped capstone design project have received substantial positive responses on the improvements on technical and soft skills, based on the feedback from students and graduates.

Key words: Capstone Project; Plant Design; Project-based Learning; Industry; Assessment

Introduction

Engineering Accreditation Council (EAC) have set a compulsory requirement for all the engineering programmes in Malaysia to introduce an integrated capstone design project. In the Chemical Engineering discipline, Plant Design Project is one of the well-established capstone projects for the students to apply all their knowledge and skills learned from the previous 3 years in the 4-year engineering programmes.

In the Bachelor of Chemical Process Engineering (CPE) degree at the Malaysia-Japan International Institute of Technology, Chemical Process Design course is a pre-requisite course for students to enroll, before they could enroll in the Chemical Plant Design Project course; the two sequential courses are aligned with the integrated capstone design project that is required by the EAC. The two courses requires assessments which are corresponding to Programme Learning Outcomes (PLOs), including development of soft skills, such as communication skills, professional ethics, life-long learning, environmental and sustainability, project management.

The Chemical Process Design course was originally a conventional theoretical course with three credits in the 7th semester of the 4-year programme, while the Chemical Plant Design Project (i.e. capstone design project) is a four credits course in the 8th semester (i.e. final semester). Based on benchmarking with a number of chemical engineering programmes in Malaysia, these programmes are implementing the capstone design project as a two-semester course, which provide sufficient time for the students to produce a satisfying project output. In addition, the capstone design project in many universities are much depending on respective academic supervisors (i.e. university lecturers) for the student teams.

The academic supervisors may have inadequate understanding on the requirement of the capstone design project. This challenging scenario creates a difficult mechanism to assure quality control and learning experiences of the

students. In some institutions, kinds of assessments done are depending on academic supervisors; there is a concern on reliability of these assessments in the project.

Project Novelty

The capstone project design committee decided to introduce the capstone design project in the Chemical Process Design course (which was originally theoretical course). This revision initiated horizontal integration, which supports the learning of with both theoretical and practical aspects, as shown in Figure 1. In addition, at the same time, the revision aligned with the theory of Project-Based Learning (Blumenfeld et al., 1991) and Learning-by-doing (Reese, 2011). With the revision, the course lecturer/coordinator could provide necessary supports to students during the lectures (i.e. theory) according to project progress. With the knowledge gaps found during the project work, the theory classes are able to scaffold the students appropriately with the support of sufficient students' interests.

The capstone design project committee also decided to formalize industrial inputs in the capstone design project, which could maximize the learning opportunities for the students. The industrial supervisors are officially appointed by the faculty for arranging regular consultations for the students. Meanwhile, the assessments of the project are designed carefully for ensuring the reliability of the assessment. Each chapter in the reports for all the students teams are evaluated by the same lectures with relevant knowledge, which the assessors are able to compare the quality of the reports and provide reliable results. The Presentation 3 invites lecturers from other institutions of higher education and industrial experts to evaluate the students' exhibition from Phase 1 to Phase 2, which expect to provide another round of knowledge exchange to the students from different perspectives. The project has also incorporated self and peer assessment for measuring the efforts of the students, which also serves as a reflection to the students (Foong and Liew, 2020). The results have been incorporated in all the team assessment elements through auto-rating approach.

This revision (Figure 1) aimed to maximize students' learning experience in plant design capstone project for chemical engineering programmes. The improvements are summarized as: (a) integrate the teaching and learning of the Chemical Process Design theoretical course with the assessment through Chemical Plant Design Project courses for promoting project-based learning implementation, (b) introduce holistic assessment with multi-objectives and multi-dimensions to provide various feedback to the students on the technical and soft skills development, (c) enhance various industrial involvements for to provide relevant information and knowledge from different perspectives.

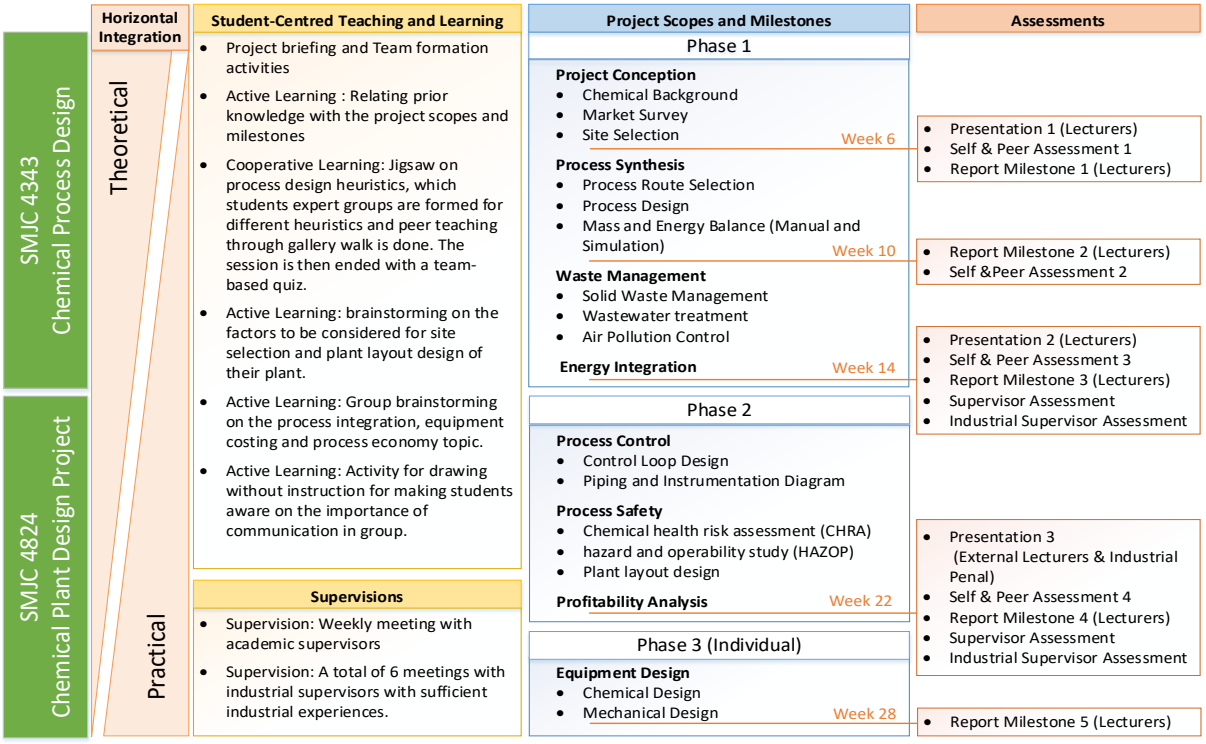

Figure 2: Capstone Project with student-centred teaching and learning with holistic assessments

Project Innovation

The two sequential courses are revamped and introduced in three areas, which are explained as follow:

a) Integration of Teaching, Learning and Assessment through Cooperative and Project-based Learning

The integration of the theory and project (practical) classes is used in these two courses; in which the course coordinator would be able to provide relevant scaffolding to the student at the right time. Student teams are made consistent for Chemical Processing Design and Chemical Plant Design Project. The soft-skills elements in the assessment are highlighted in the teaching and learning activities in the classroom. For example, some activities are done to enhance students' awareness in the importance of communication among team members and being considerable to the teammates.

b) Holistic Assessment drives the development of Holistic graduates

Assessments in the two courses are multi-objectives with various technical and soft-skills assessments using various types of assessments from different perspectives/dimensions, as shown in Table 1. The courses use multi-dimensional assessment methods, which include judgements of self, peers, academic supervisors, industrial supervisors, lecturers, external assessors (i.e. lecturers) and industrial panels.

Table 1: Holistic assessments with multi-objective and multi-dimension

		Self	Peers	Academic supervisors	Industrial supervisors	University lecturers	External assessors**	Industrial panels
1	Reports*	√*	√*			√		
2	Presentations*	√*	√*			√	√	√
3	Teamwork	√	√	√	√			
4	Project Management*	√*	√*	√				
5	Ethics			√				

*Auto-rating on the assessment score based on self and peer assessments; ** External assessors refers to lecturers from other universities

In project-based Learning environment, the team dynamics are required to be observed. The self and peer assessments are implemented four times throughout the two semesters. Training is conducted on writing constructive feedback for ensuring the validity of the assessment and reflection proposes of the self and peer assessments. In addition, individual credibility is also important for ensuring the teams to be able to function well. The individual and team assessments are both highlighted in the assessments. In order for assessments results to be personalised and useful for each student, self and peer assessment have been used as an indicator for student's efforts in the group works, which is incorporated through auto-rating method. The industrial supervisors are not involved in the technical report assessments to uphold the reliability of the assessments. Each chapter of the technical reports from each team are given to the same university lecturers for assessment. During the project final presentation in exhibition, only external assessors (i.e. lecturers) from other universities and industrialists are invited to evaluate the projects. This initiative aims to ensure that the students are well-prepared to encounter contradictory comments.

c) Comprehensive Industrial Exposure to meet expectations of future employers

In many universities, the industrial involvement is encouraged but it is normally personal initiative of an academic supervisor. Since the two courses in this Bachelor of Chemical Process Engineering degree act as a conclusion for the graduating students, industrial exposure is important for providing the students pre-exposure on their future employers' expectation on their work quality. In these two courses at MJIIT, there are two types of industrial involvements, which are industrial supervisors and industrial panels (i.e. evaluators) for the final presentation.

The industrial supervisors are appointed by the faculty to provide effective commitments with the student teams whose projects are related to their expertise. The industrial supervisors are expected to provide feedback on the project progress from an industrial perspective. Based on meetings and interactions with the student teams, the industrial supervisors evaluate team dynamics. In addition, these meetings enable the students to observe thinking processes of their industrial supervisors, who are practicing engineers. The industrial supervisors allocate a portion of marks for evaluating the team working skills demonstrated by the students during the regular meetings. In addition, industrial panels are appointed by the faculty to assess final presentation of the students' projects. The panels visit the student presentation booths to listen to explanation from the students on all parts of the capstone design project. The panels are providing industrial insight from a bird's view, which reminds students on the technical aspects that they have missed. This question and answer session is essential for the students, in which the students could experience an atmosphere of professional presentations in the real working world. The industrial panels also provide their input to

students on strengths and weaknesses of their project. The students will be feeling the way of future employers questioning the subordinates in working environment.

Project Impact

The capstone design project had contributed positive impacts to students, in a wide range from technical to generic (personal) skills. Students highlighted that their awareness on teamwork and communication skills were learned throughout the project, which was an eye opener. For example, student noticed the project gives positive impacts to their learning, in which it is supported by a student informed that that "I believe that the process of learning on how to work in a team is vital in this plant design project and it can be done perfectly when each team member is able to voice out their own opinions supported by justifications with confidence". The evidence is further enhanced, a student informed that "We are given chances to experience on how to be a leader, voicing out opinions, presenting ideas and defending decisions when being questioned by others".

The student-centred learning activities managed to help the students in mastering technical skills needed for the project. A student commented that "He (course lecturer) organized different classroom activities such as peer-to-peer teaching which made the learning processes to be more interesting and understandable." Another student told, "The activities went well and make me easy to understand and remember what I have learned. The knowledge gained was really helpful for the process design and plant design project." Secondly, the industrial supervisors also made significant impacts. A student informed that "The sessions we had with the industrial supervisor were one of the hardest as he kept pushing us off the edge with our ideas. He was trying to get us to justify all the decisions that were made for the design project. At that time, it was the most stressful thing we had to go through because he kept pointing out that, how not everything that we learnt from the books can be done in the industry". A student felt that "I am very grateful that we have industrial supervisors to guide us throughout the whole project. The industrial input is always helpful and able to solve our doubts regarding the project." Last, the assessments have changed the ways students think. They have started to think from others' perspective, which is supported by "I think the self and peer assessments are important to keep the group in shape and allow all of us to improve in a healthy and effective way". Another student echoed, "The implementation of peer assessments after every milestone really help my team to understand how we can commit and contribute more effectively to our team's results and teamwork processes".

Acknowledgement

We are grateful for all the comments from EAC Panel, academic supervisors, industrial supervisors, industrial panels, external assessors, lecturers, graduates and students who were involved. Their engagement has enabled the two course to grow from time to time. The teaching team also appreciate the MJIIT management for their financial supports in all the initiatives done for this revamped capstone design project.

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Integrating Conceive-Design-Implement-Operate practices to enhance GIS Training Camp 2 Implementation

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Highlights: GIS Training Camp 2 aim to equip students with knowledge and skills in designing and developing spatial database and GIS application. With education moving toward Future Ready Education and IR 4.0 and IR 5.0, there's a demand to enhance current course's content, that should involve stakeholder's engagements, facilities and locations. To improve current implementation, CDIO practices was integrated within the course planning and implementation and adapting with real-worlds scenarios. Six phases of implementation were implemented, from project planning to GIS application development, to suite best with CDIO practices. Besides that, engagement with industry and stakeholders also being implemented, where the real-world issues were raised and being discuss with students, stakeholders, with guide from lecturers. The results of CDIO integration with course content shows that student can adapt and adopt what they've learn from previous courses, and how to become a group leader and group's member, and how to collaborate with other groups to proposed and developed different GIS applications to solve different requirements.

Key words: CDIO; GIS; GIS Training Camp; GIS application development.

Introduction

GIS Training Camp 2 is part of course in Bachelor of Science (Geoinformatics) Program, offered at Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia (UTM) (FABU, 2019). This course was offered on third year, first semester. The aim of this course is to equip students with knowledge and skills in the design and development of spatial databases and GIS application to support spatial decision making. Student will work in small groups to develop a conceptual design for GIS database and built spatial database using available digital data, before design and develop a GIS application based on their design. With education moving toward Fourth Industrial Revolution (IR 4.0) and Fifth Industrial Revolution (IR 5.0), integration with Internet of Things, Cloud-based application, and Smart facilities has become important, and interaction between human intelligence and cognitive computing is demanded especially in organizing spatial data that involved with human, facilities and it's locations (Erol et al., 2016).

To improve the implementation of GIS Training Camp 2 to be align with IR4.0 and IR5.0, conceive-design-implement-operate (CDIO) practices was integrated within the course planning and implementation. CDIO can be defined as instructional project-based leaning approach that employ instructional events in which learning occurs through the creation of a product, process, or system (Edström & Kolmos, 2014). Via utilizing CDIO approach, it will promote innovative thinking and equip students with high-level problem-solving skills (Sulaiman et al., 2016).

This study aim is to redesigning current content and implementation, with integration of CDIO practices to improve student learning, with adaptation of knowledge and skills in geospatial fields, with real-world scenarios.

Redesigning GIS Training Camp 2 Implementation

To redesigning and implementing scenarios-based learning in GIS Training Camp 2, an early planning of course content and implementation has been done. To integrate SBL into current GIS Training Camp 2 contents, six phases of implementation has been designed and implemented. This phases show in figure 1.

For session 2018/2019, the theme for GIS Training Camp 2 is Edu-Tourism. The main stakeholders for this session is UTM Campus Edu-Tourism, Cluster of Sport, Recreational & Edu-Tourism Business Management Division Office of Deputy Vice Chancellor, UTM. Stakeholders was call to give talk, and then student can interview and get additional information on how to integrate spatial information, and to design and develop GIS application for UTM Edu-Tourism. In the conceive phase, students were given task to identify what is the real meaning of tourism, edu-tourism and what the main problems when there's no spatial information regarding edu-tourism in UTM. Student started the cycle by generating many possibilities, and during this phase, student worked in their groups and carried out numerous discussions among group member, and also with lecturer. Lecturers are highly involved in student's discussions, and provide several ideas to suite student's idea, with some constrains in mind, such as student capabilities and times. Student then decide their final decision.

In design phase, after student identifying current issues in edu-tourism in UTM, student start to design several diagrams, including use case diagram which aim to identify who the client/stakeholders involved, and the task for each client/stakeholder. Besides that, student also design content diagram, entity-relationship diagram (ERD), data flow diagram, and workflow diagram. Each team member distributed their work so that everybody has their own responsibilities with smaller task.

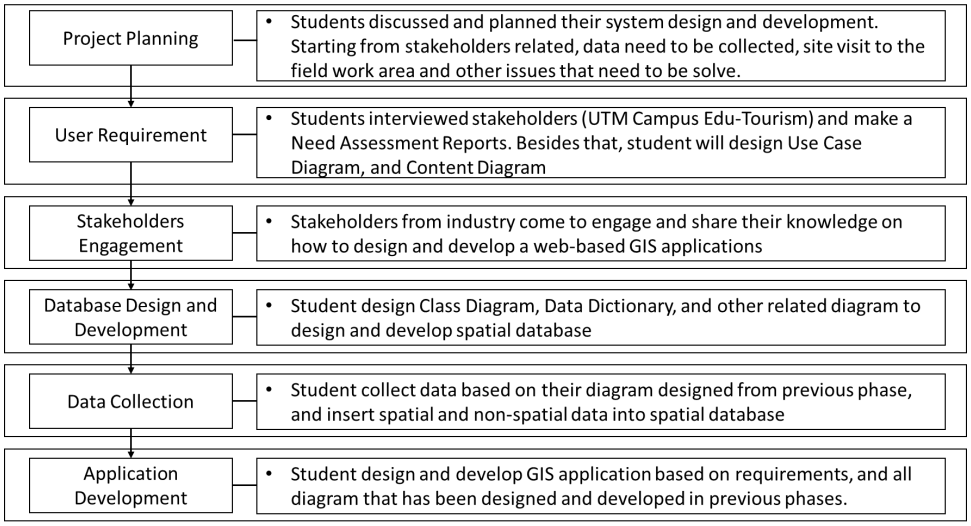

Figure 1: Phases to implement CDIO in GIS Training Camp 2.

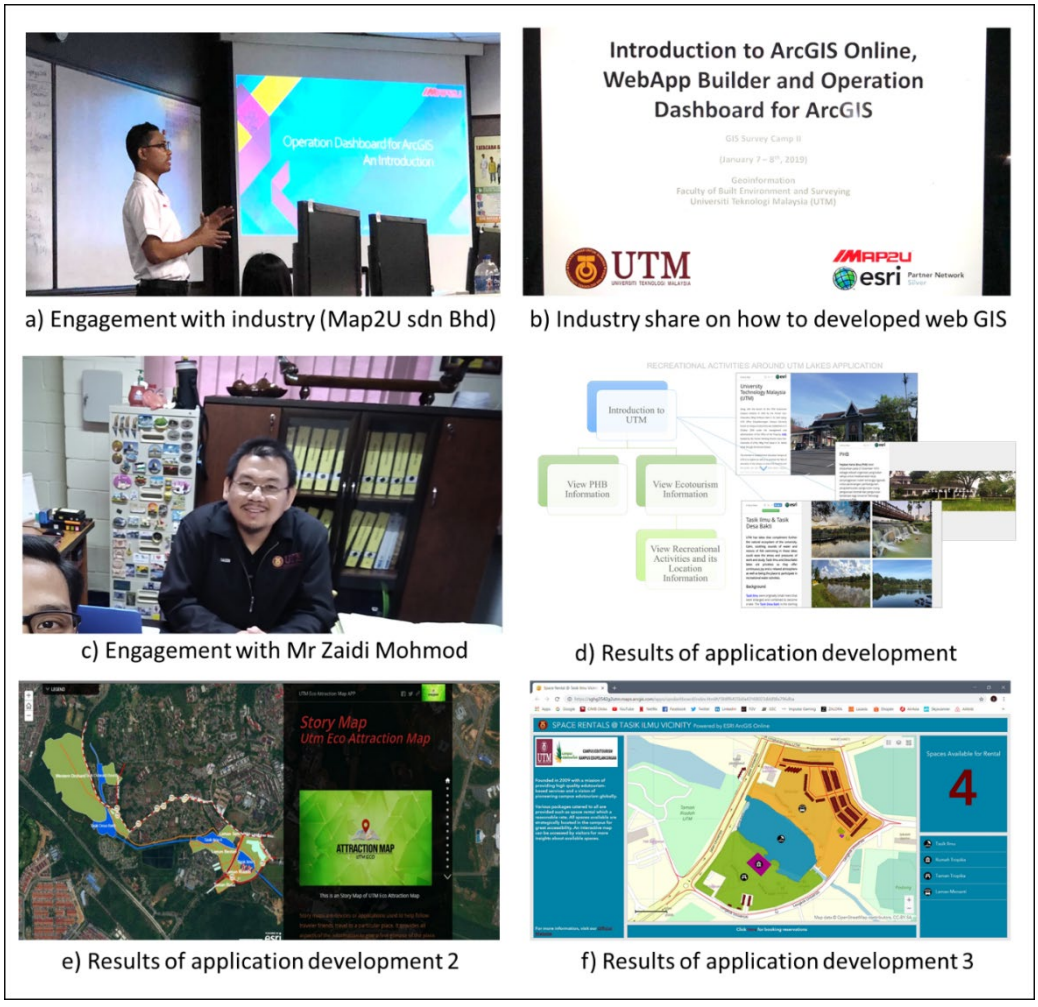

Figure 2: process of CDIO integration in course implementation.

After design phase, the next phase is implementation phase. In this phase, student design and develop GIS application based on web-based platform, which is ArcGIS online. This stage very exciting, because student able to view and understand better the process and stages in developing the application. But at the same time, some of the functions are not working, which require student to find solution with their programming, with facilitation from lecturers. A lot of time spends in this phase, and student was given encouragement and some solutions from their teammates, web search, and also from lecturer.

In the last phase, which is operate phase, most of the major task was done, and student need to fine-tune their GIS applications for enhancing its performance and efficiency. In this phase, GIS application that was developed ready for viewing and assessment. Student presenting their work, and panel will discuss on the functions, and align back their design with their final products. This will enhance student communication skills, especially, presentation skills, where student was assess based on rubric to see their achievement.

With implementation of CDIO into this course, student able to conceive the idea on how to plan a good GIS project, how to design a diagram from starting to end of the project, and how to developed a GIS application based on user requirement, with providing Need Assessment Report. This implementation also provides the real-world situations, with different clients have different perspectives, and how to solve their problems with GIS solutions and enhance client's information when doing decision making.

Conclusion

The results of CDIO integration with course content shows that student can adapt and adopt what they've learn from previous courses, and how to become a group leader and group's member, and how to collaborate with other groups to proposed different modules to solve different requirements.

The final results for CDIO integration in this course's content is the GIS application, based on stakeholder's requirements. The process and results of redesigning this course show in figure 2.

Acknowledgement

We are grateful for the lecturers whom involved in GIS Training Camp 2 course (SGHG3542) semester 1, session 2018/2019, from Department of Geoinformation, Faculty of Built Environment and Surveying, UTM. We also grateful for students from third year Bachelor of Sciences (Geoinformatics) session 2018/2019. We also grateful for Mr Zaidi Hj Mohmod, Cluster of Sport, Recreational & Edu-Tourism Business Management Division Office of Deputy Vice Chancellor, UTM for his guidance and information. Throughout this course.

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New Paradigm on Schools Co-Curricular via Drone for Edu Challenge 4IR

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Highlights: When the pandemic of COVID-19 has shaken the world in early 2020, it has paralyzed most of the industries especially education, locally and globally. Academics play significant role to turn the challenges and adversities of COVID-19 into opportunities and meaningful learning experience. Drone Edu Challenge 4IR co-curricular is a new paradigm that incorporates webinars, quizzes and also programming tasks, designed in competition mode for school students. It incorporates the concept of quadruple helix innovation model where government-university-community-industry (GUCI) work hand-in-hand in addressing the uncertain future through effective learning environment via heutagogy approach and scenario-based learning.

Key words: Drone Edu Challenge IR 4.0, STEM Education, Heutagogy, Peer Learning Community

Introduction

COVID-19 shockingly have paralyzed most of the social and economic activities in Malaysia and the world. Millions of individuals globally has fallen into disadvantages due to the global recession and structural change to the world economy (WEF, 2020). The impact has caused a number of institutions, including schools and universities to shut down. In the event of uninvited pandemic, the attempt to flatten the curve of the spread of the virus has urged the academics and teachers to redesigned their curriculum and co-curricular to suit the current condition. Co-curricular activities are really important as it will enhance students' soft skills. The social capital theory states that active participation in social activities promotes various qualities of human beings, including leadership skills and networking (Abd Ghani, 2020). However, in the midst of the Movement Control Order (MCO), it is almost impossible to execute the co-curricular activities when most of the students have to remained at home and abide to the physical distancing.

As academics at Universiti Teknologi Malaysia (UTM), we realize the importance to inject the co-curricular activities with the element of 4th Industrial Revolution (4IR) (Pusppanathan. J et. Al (2020)). regardless of the limitation during the pandemic. It is the defining moment to make decision and choice for the next generations by integrating the drone technology to the school's curriculum during the MCO period. As the world today revolves in 4IR, where it is all about internet of things, cloud computing, autonomous system and etc., educators shall use and leverage the bounty of technological innovation to unleash students' potential.

Adhering to the principles of no one left behind, it is the responsibilities of the academics to uplift education through Drone for Edu Challenge 4th Industrial Revolution (DEC 4IR) as the new paradigm for the school's co-curricular to reshape the future of Malaysia. Hence, DEC 4IR was introduced and aimed to

- Introduce Drone technology to school students
- Raise awareness of the use of drone technology to school students
- Associate Drone technology with STEM education at schools
- Build programming skills among school students

Since this competition is merely designed to encourage the learning through new paradigm of co-curricular, hence, it allows the organizing committee to explore Heutagogy approach where it allows the participants (students) to decides what to learn and it is supported by external resources from the internet. In the age of knowledge and skill emancipation, learners evolve from passive recipients to analysts and synthesizers. It is a revolution in which teachers can no longer lay claim to the stage as the sole expert by virtue of access to information. The students now are at the center of the learning process rather than the teacher or the curriculum. It encourages the flexibility, forges new paths, new questions, and new contexts. The students' self-determined will lead to transformational experiences; this benefits individual learners and ultimately society (Blaschke, 2016). There are 7 elements of Heutagogy which are approval, facilitators, choice, agreement, review, assessment and feedback. They are incorporated in the design DEC 4IR. In this DEC 4IR competition, during the final phase, scenario-based learning (SBL) was used through interactive scenarios to support active learning strategies (Papadopoulos, 2019). In the process, students must apply their knowledge to solve the problems given. This allows the students to optimize the knowledge gained from the webinar and modules. Through SBL, students will enhance their critical thinking and problem solving skills in a safe and real-world context. It can be seen through the final phase of the competition when the students are required to solve the programming problems to fly their drones.

Drone for Edu Challenge 4IR

When one door closed, another door opens. Education is the key to revolutionize the economy and society. Since, the impact of drone technology is to be forecasted worth at US$127.3 billion by the end of 2020 due to its significance in the global market of infrastructure, agriculture, transport, telecommunication, entertainment, mining, logistic, law enforcement and security. We believe that it is crucial for schools to adopt drone technology and apply to the students. The fresh and unique idea to enrich the learning environment for the students during MCO allows the DEC 4IR to come into the picture.

The advanced yet encouraging co-curricular were designed as the following:

1. DEC 4IR Competition for all Form 1 - Form 5 secondary school students (aged 13-17 years old)
2. Students shall undergo quiz based on the Drone Module (Webinars)
3. 16 Finalists are given Drone to complete the mission of flying drone through programming tasks.
4. Mini Quizzes for students to encourage the learning process.

Due to the unique designed, the project manages to bring the counterparts from all the industries, communities, non-governmental and non-governmental agencies to work hand-in-hand in a quadruple helix setting. The programme received full support from the Ministry of Education and Iskandar Investment Bhd. The program was also highly supported by The Malaysia Digital Economy Corporation Sdn Bhd (MDEC), Vrinity Medini, Institute of Human Centered Engineering (iHumEn), Sport Innovation & Technology Centre (SITC), Centre for Engineering Education (CEE), School of Education, UTM; OFO Tech Sdn Bhd, Archidrone Sdn Bhd, Kelab Remaja Udara Malaysia (KRUM), and Malaysia Unmanned Drones Activist Society (MUDAS).

Initially, the program was designed for students in Johor. However, due to the overwhelming responses, the registration for the competition was open to students from all over Malaysia. The program which was designed for only 500 students were able to gage 2888 students and 500 teachers from the whole Malaysia. The industry is convinced by the new paradigm of co-curricular and decide to add more prizes for the students via Tickets to Vrinity at Medini the students can experienced the portmanteau of Virtual Reality and infinity. This also gave the opportunity for the students to learn on the emerging technology and concept of infinite through the advancement of 4IR. The novelty of this programme is also not limited to the learning and teaching for the students in the competition. Interestingly, DEC 4IR has successfully unleashed the potential of academia (organizing committee) to proactively and professionally apply NALI in producing digital materials through module and webinar prepared by the UTM experts on Drone, Artificial Intelligence, Programming, STEM education and 4IR. The academics are now enriching their approach in teaching and learning through the use of Kahoot, breakout rooms, Handly Streaming Live and webinar via streamyard and etc.

DEC 4IR Execution

Generation Z is the generation that engage with gadgets the most, they are fast in acquiring knowledge, tech savvy, prefer visual and need continuous updates and stimulations. Dealing with generation Z requires educators to be more creative in the approach and content of delivery. Hence, DEC 4IR was designed by leveraging the social media platforms. It comprises of webinars, quizzes and also programming tasks using digital platforms where the mode of DEC 4IR operation was stimulated thru a competition.

To ensure that the students understand the Drone Technology, 12 videos were recorded by UTM experts, such as Component of Drone, 4th Industrial Revolution, Internet of Things, Future of STEM in Malaysia, Artificial Intelligence and other related drone educational materials. The students were required to study the videos and answer the quizzes accordingly. To date, each video has at least an average 2.7k views. After the students have completed all the quizzes in the first stage of the competition, 16 best students were selected to undergo drone programming exercise and flying their own drones in the second stage. After the practical, they underwent an interview at the last stage of the competition before they were awarded as the national champion of "Drone Edu Challenge IR 4.0". The rest of registered students can still participate in a series of "Mini Drone Quiz" for them to stand a chance to win Lego Mindstorm, drone sets, tickets to Vrinity and MyHeroBadges from MDEC.

Innovativeness

The co-curricular introduced through this competition format of Drone Technology has never been conducted in elsewhere especially the quiz, webinar and programming format that gave meaningful learning experience for the students. Most of the available drone competitions are highly relying on drone flying skills that focus on speed. However, this co-curricular allows the students to learn and enrich their knowledge on a wide range of drone, safety, STEM, 4IR, artificial intelligence and etc., yet they are able to experience flying drone. Most of the students highlighted that they are proud to be the participants of this competition as it allows them to explore the future of their career. Interestingly, despite it is an individual competition, it could be seen that most of the students are actually working together with their friends, family and teachers and thus promotes peer learning. On the other hand, for the participants who did not pass to the final round, they still have the chance to join the mini quizzes created specifically for them based on the webinars and modules developed. This still allows the students to learn and indulge in the beauty of Drone technology, despite that they are not able to compete at the final stage. Since the format of competition has an impact for the students from all over Malaysia, regardless of the locality, hence, the stakeholders have requested to bring DEC 4IR to the international level. They are excited to spread the programme to reach a wider audience. They believe in new paradigm of the co-curricular through organizing DEC 4IR competition

Impact

The heutagogy framework has successfully promoted peer learning community among the students. By taking into the account of the characteristics of generation Z in the co-curricular development of DEC 4IR has amplified the impact to the learning experienced by the students. The SBL applied to the finalists kept them motivated to break the programming codes. The missions given through SBL has successfully improved student knowledge retention as they were actually dealing with the scenario and experience visually and in practice. The stimulating experience in designing the co-curricular for DEC 4IR for secondary students has given an impact to the students, teachers as well for the stakeholders and strategic partners. Even before the program started, the sponsors were very much interested and trust with the co-curricular of the program. This is the result of entrepreneurial academia aspired from the New Academia Learning Innovation Mode. The impact to the students is emulating. Based on the interview from the students,

students A: I felt honour to be part of DEC4IR and learned about Drone. I am planning to continue to study in the autonomous area for my career.
Students B: Even though we are not listed as the finalist, but our journey did not end here, lets join this webinar to learn about Drone.

Regardless of the results, most of the students are motivated to venture into the Drone Technology even after the competition has ended. From the interview conducted with the students, most of them felt empowered because of the knowledge and experience gained from DEC 4IR. Students enriched their Drone Technology, STEM knowledge and etc. They also successfully leverage their Information and Communications Technology skills through programming, video recording and etc. The impact of the program is also felt by the sponsors and strategic partners. The juries of the competition also felt the impact of the program, they praised the program execution structure that is dynamic and comprehensive. The sponsorship acquired for the program is RM 28,000.00. The program also has been approved for the intellectual property. This program has full potential to be commercialized due to the huge impact to the students, schools, stakeholders and strategic partners.

Acknowledgement

The programme was organized by Universiti Teknoloogi Malaysia and had received full support from the Ministry of Education and Iskandar Investment Bhd. The program was also highly supported by The Malaysia Digital Economy Corporation Sdn Bhd (MDEC), Vrinity Medini, Institute of Human Centered Engineering (iHumEn), Sport Innovation & Technology Centre (SITC), Centre for Engineering Education (CEE), School of Education, UTM; OFO Tech Sdn Bhd,

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Creating A Sharing Culture For Future-Ready Educators

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Highlights: In Universiti Teknologi Malaysia (UTM), future-ready educators (FREE) Program is one of the Synergy Initiatives 4.0 in 2019. Azman Hashim International Business School (AHIBS) stands out to organize FREE Month to focus on developing teaching and learning skills of educators to become future-ready. The FREE Month activities involved knowledge transfer and hands-on training for lecturers in AHIBS. Through the trainings, the lecturers are able to apply the knowledge they learn to increase learner agency, empower students to take ownership of their learning, increase motivation and engagement, and allow students to take responsibility for their learning and their lives.

Key words: Future-ready educators; knowledge transfer, students engagement and empowering

Introduction

Future-ready learning means focusing on the development of students skills and attributes, replacing traditional learning with a range of new pedagogical approaches that will provide students with the tools they need to be successful, and producing curious, engaged, and resilient individuals who are able to take on the challenges of the 21st century and beyond. Therefore, Future-Ready Educators (FREE) are important for learning and teaching for the millennial, community of practices in learning and teaching, future ready curriculum in terms of flexibility and differentiated career pathway basic competency in teaching.

In Universiti Teknologi Malaysia (UTM) FREE Program is one of the Synergy Initiatives 4.0 in 2019. Azman Hashim International Business School (AHIBS UTM) stands out to organize FREE Month to focus on developing teaching and learning skills of educators to become future-ready. It can directly improve students' higher-order thinking skills, promote long-term memory retention and enhance their "learning to learn" skills.

The event was officiated by the Dean of AHIBS, Professor Dr Nur Naha Abu Mansor. The AHIBS FREE Month, took place from 25th August to 30th September 2020 with a theme "Nurturing Future Learning". During the FREE month, many activities were organised for the lecturers including 9 face to face workshops and 4 webinars. In Johor Bahru, there were 10 series of FREE workshops and webinars. The workshops involved knowledge transfer and the hands-on training. Some Education 4.0 tools such as Kahoot, Google Form, Google Classroom, Padlet, Mentimeter, Webex, UTM e-learning, Jamboard, Microsoft PowerPoint and Filmora were included in the hands-on trainings. The online and offline knowledge sharing sessions include synchronous and asynchronous learning, ice-breaking with students, case study and cornerstone project. On the other hand, in AHIBS Kuala Lumpur, 3 webinars were conducted. The first webinar involved international speakers from USA, UK, Pakistan and Brunei who shared their experience and perspective in Active Learning and Future Education. Another two webinars involved speakers from AHIBS and the UTM Corporate Office.

AHIBS FREE Month

AHIBS used five steps of creative process to bring the ideas of AHIBS FREE Month to fruition—preparation, incubation, insight, evaluation, and verification (Saviolo, 2016). The first stage is the idea of preparation, task force of AHIBS FREE was discussing about what FREE activities have done before and what kind of activities should be planned in future. The second stage is incubation where group leaders and sub-group leaders were given a week to propose FREE activities. The third stage is insight in which AHIBS has series of activities proposed by the task force then Deputy Dean (Research, Innovation and Development) and Chairman of FREE Assoc. Prof. Dr. Suresh Ramakrishnan gave the

'Eureka' moment to categorize the activities under AHIBS FREE month. The fourth stage is the idea of evaluation. It is very important part due to a limited amount of time to do certain things. This stage involves self-criticism and reflection to decide the activities that have the most merit to work on. The last stage is called elaboration. This is where Edison said that it's "1% inspiration and 99% perspiration". In this stage, FREE task force contacted the speakers to decide suitable dates for hands-on workshops and webinars, designed the banner and bunting for AHIBS FREE month, designed the posters for each hands-on workshops and webinars, prepared the training rooms and refreshments, applied attendance for teaching and learning, promoted the workshops and webinars to attract more lecturers to join, assigned cameraman for photo taking and video shooting, invited guest-of-honour Director of Curriculum Innovation and Development Unit (CIDU) Assoc. Prof. Dr. Naziha Ahmad Azli for the AHIBS FREE month closing ceremony, decorated the hall for closing ceremony and etc. Now, AHIBS has finalized the FREE Month, brought the idea to life, and shared it with entire UTM.

Innovativeness reflects the AHIBS's tendency to embrace new FREE practices and go beyond the current state of the art. Rebrand and restructure the governance of AHIBS FREE program is very important for innovation. The innovation of FREE program governance is to make balance between AHIBS' ability and opportunities that exist in the environment so as to achieve long-term objectives. Education needs to focus more on the development of "soft skills" and attributes of students. This is because traditional education which emphasizes the transfer of knowledge from teacher to student is decreasing in relevance.

The AHIBS FREE month aims to build and nourish a culture for innovation and change. FREE task force used the AHIBS FREE month to help lecturers in AHIBS to understand that knowledge sharing is a personal benefit. The task force has one important task: to lead by example. The FREE group leaders think and work by giving the new value to knowledge, the sub-group leaders and their members will understand the importance of being an active part of the knowledge sharing culture. The first hands-on training was given by group leader Dr. Thoo Ai Chin. The title of sharing is "Make learning a game with Kahoot! Convert Kahoot! For e-content for bonus in eLPPT". Through this, other lecturers will act and rethink their roles and positions and contribute proactively to empowering the processes and management.

FREE Month is used to identify the experts in teaching and help them be the advocates of knowledge sharing culture. The role models are necessary for every culture. Thus, FREE month is a springboard to elevate the status of experts and give them more opportunities to teach and exchange what they know. In addition, to reward behaviours that are created to re-use and re-share knowledge, AHIBS organized a FREE Month closing ceremony with sumptuous lunch to recognize the contributions of FREE coordinator, group leaders, sub-group leaders and speakers for hands-on workshops and webinars. Besides rewarding those lecturers who have shared knowledge, AHIBS also reward participants for making an effort to receive knowledge through CPD and free lunch. Knowledge sharing is a collaborative effort with objective to help other lecturers develop new knowledge in their teaching and learning.

However, sharing knowledge and helping other might look like additional work requirements. As FREE group leaders and sub-group leaders, the main job is to inculcate the value to their members that the knowledge sharing activities must not be perceived as additional tasks or work requirement. Knowledge activities must be integrated into everyday work processes. As such, FREE program is used to make knowledge sharing a formal part of responsibilities, including it in a job requirement.

New Academia Learning Innovation Model is a framework focusing on student-centred and blended learning. The use of different learning modes and is important to produce entrepreneurial academia (Ujang, Alias and Aris, 2013). AHIBS FREE Month is a platform used to improve the quality of teaching and learning by sharing multiple student-centered teaching methods such as gamification, case study teaching, video, UTM e-learning, problem-based learning and etc. The AHIBS FREE Month is focusing on developing teaching and learning skills of educators to become future-ready. It can improve students' higher-order thinking skills, promote long-term memory retention and enhance their "learning to learn" skills.

Conclusion

The closing ceremony only marks the end of the FREE Month program, not the knowledge and practices in teaching and learning which should be carried on and enhanced further. Since the FREE Month workshops involved knowledge transfer and the hands-on training, this means that lecturers in AHIBS are able to apply the knowledge they have learnt to increase learner agency, empower students to take ownership of their learning, increase motivation and engagement and build initiative, allow students to take responsibility for their learning and their lives.

Acknowledgement

We are grateful to the AHIBS group leaders, sub-group leaders and supporting staff who put a lot of efforts into establishing the FREE program in AHIBS, the speakers for accepting the invitation and the participants for their interest in the workshops and closing ceremony.

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Empowering Experiential Learning via Audit Simulation Software

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Highlights: This paper discusses the effectiveness of experiential learning towards students understanding and capability of performing an audit work via audit simulation software. Typically, audit courses has been taught using lectures, in-class discussions and text materials.
Nevertheless, to enhance and complement the in-class learning, students were exposed to a hands-on experience using an actual software (Audit Express) used in professional audit practise. A survey was performed to students who attended the training in identifying students' perceptions on this learning technique. Findings from the survey indicates that most students agreed that this learning technique enhances their understanding of the audit process and is observed as an important and learning technique to be embedded in future curriculum.

Key words: Experiential Learning; Auditing, Audit Process; Audit Software

Introduction

Experiential learning refers to as a process of learning through experience including hands-on, observation, interaction or walk-through activities, apart from the norm of learning from a book or reading. According to McCarthy (2016), learning techniques including experiential learning, active learning, interactive learning or 'learning by doing' poses positive result to an individual. This paper highlights how experiential learning could enhance students understanding and improve acquired skills to perform audit for Audit course in Azman Hashim International Business School (AHIBS), Universiti Teknologi Malaysia. By embedding hands-on workshop in teaching audit, thus by exposing students to using an actual software (Audit Express) used in professional accounting and audit practice, would enhance their understanding of the overall audit process. Students also has the opportunity to apply their knowledge, among others, in accounting, audit, finance, governance when performing the audit simulation. The aims of this study were to investigate whether students found the using of audit software enhances their understanding and skills in performing an audit, and to identify their perceptions its effectiveness on their learning experience.

NALI Implementation

In the effort to innovate students learning, the method of embedding audit simulation using software has been introduced to students who attended Audit 2 course for Bachelor of Accounting starting year 2018. The previous teaching methods were mainly lecture, case-studies and brainstorming which were all sufficient to provide students with the theoretical or fundamental knowledge on the topic studied. Learning audit has always been a challenge for the students because the nature of the topic itself relates a lot on the actual professional audit practices and merely class lectures can be dry at times. However, in 2018, Audit Express was introduced to the students as part of the Audit 2 course content which covers the need for students to use technology in performing the audit work. The feedback

gathered from this study will help provide or instill new ideas to researchers and educators on how to innovate new teaching techniques in the classroom, to make learning more engaging and interesting.

The objectives of introducing this teaching innovation includes:

1. To enhance students' understanding of the audit process topics which includes Audit Evidence and Documentation, Audit Materiality, Audit Cycle, Technology in Audit and Audit Report.
2. To provide exposure to students on scenario-based learning among students by performing the entire audit process using audit simulation software.
3. To enhance students' ability and proficiency in handling the software when performing audit.

Students were required to attend a 2-day workshop with a certified trainer for Audit Express. Students were given instruction manuals and documents relevant to the audit work. Post-workshop, students were allowed to practise using Audit Express for about 2 weeks, Finally, they were required to sit for a certification examination in order to test their ability, proficiency and competency to handle audit work using the software.

Research Methodology

A survey questionnaire, using a 5-point Likert scale, was distributed to all students of Audit 2 who have attended Audit Express workshop. The questionnaire was distributed using Google Form. A total of 128 responses were gathered and analysed. A descriptive analysis was performed to investigate student's perceptions of their learning experience using the software.

Findings and Discussion

The survey gathers 128 responses, of which it includes 84.4% (108) female and 15.6% (20) male respondents. Additionally, Table 1 illustrates the finding of the study.

Table 1: Findings of Student's Perception on Audit Express Workshop

Survey Items	Percentage (%)				
	Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
Audit Express software is easy to learn	0	0.8	11.7	43.8	43.8
Audit Express menu is easy to understand	0	0.8	7	39.8	52.3
Audit Express eases and accelerates audit task	0	0.8	4.7	42.2	52.3
Learning Audit Express showed me how technology improves the effectiveness and efficiency of auditing	0	0	3.1	27.3	69.5
Learning Audit Express is useful to understanding the actual auditing techniques utilized by auditors	0	0	2.3	28.9	68.8
Learning Audit Express will improve my performance in auditing class	0	1.6	8.6	33.6	56.3
Audit Express allows me to do audit tasks more easily	0	0	4.7	23.4	71.9
Audit Express is very beneficial for me as a student	0	0.8	7.8	32	59.4
I feel comfortable when using Audit Express	0	0.8	8.6	36.7	53.9
I do not refuse to use Audit Express	1.6	1.6	5.5	33.6	57.8
I am not bored with the layout / interface Audit Express	0	1.6	10.2	28.1	60.2
I will continue to use Audit Express to enhance my ability to perform audit	0	0.8	11.7	30.5	57
I would recommend accounting students to use Audit Express	0	0	6.3	25.8	68
Learning Audit Express made the auditing course more engaging and interesting	0	0	2.3	21.9	75.8
The timing of learning Audit Express is right (in Audit 2 course)	0	0.8	3.9	26.6	68.8
The time allocated to learning about generalized audit software in the course was sufficient	0	2.3	7.8	28.1	61.7
It is important to introduce students to use an audit software as an integral part of the auditing curriculum	0	0	2.3	16.4	81.3

This innovatively embedded experiential learning using audit software provides a holistic integration of important concepts and knowledge in auditing in one simulative software. Students were able to apply this knowledge into practise when working with Audit Express. Students also were able to obtain and develop practical skill in performing a complete audit process which includes setting up client profile in the system, setting audit materiality, performing the audit cycle and analysis, and finally able to produce an audit report. The experience of using express actually assesses students understanding of what they have learned in both Audit 1 and Audit 2. Findings (Table 1) reveal that more than 80% students agree that Audit Express is easy to learn and understand, while 94.5% agreed that audit task can be done more quickly. This shows that majority of students perceived that using audit software (Audit Express) in performing audit work is useful.

As for student's perception on learning experience, 69.5% respondents strongly agreed that using Audit Express as a technology audit tool, improves effective and efficiency in performing the work. Additionally, 68.8% respondents strongly agreed that Audit Express, as a computer assisted audit technique and tools (CAAT) allow them understand and experience actual scenario of conduction an audit and about 90% agree that this improves their performance in audit class. This indicates that using the audit simulation software enhances student's learning experience and understanding of the subject matter.

Most respondents (71.9%) strongly agree that allows them to perform audit task easily. More than 80% respondents agree that learning using the software is beneficial for them, easy to use, while they find the features/ layout on the system is attractive. Respondents (more than 80%) also agreed that they intend to continue using Audit Express to enhance their ability to work using the system. Concurrently, they also would want to recommend the use of Audit Express to other accounting students. This signifies that the experiences they had in the workshop helped them to understand better on the audit process and enable them to have hands-on experience in performing an audit.

Importantly, 97% of respondents agree that learning Audit Express made the auditing course more engaging and interesting. Moreover, 81.3% respondents strongly agreed that it is important to introduce students to using audit software as an integral part of the auditing curriculum. This strongly signifies that students find learning through this technique is more engaging, fun and enable them to gauge better in instilling knowledge, thus making the learning process easier. While majority respondents agreed to all the survey statements, they also gave a positive and encouraging comments on the workshop. This includes "Yes, this training benefits me as I intend to work as auditor in audit firm. Most of audit firms do use Audit Express Software as part of the audit work procedures. I find it as an advantage for me among other job applicants.". Another positive feedback was "I love using Audit Express so much because it is understandable and easy to use. And I know much better the importance and purpose of doing each procedure to auditors in order to produce a better and almost accurate audit report. I think the training benefit me as I got to understand better on how to use the software and definitely would add up my skills for future needs".

In conclusion, exposing students to an experiential learning via technology promotes new innovation in teaching and education practices, particularly in the era of Industrial Revolution 4.0 (IR 4.0) where living in a world of technology is already part of our life norm. By introducing the use of Audit Express as part of the course learning outcome, while enhancing their cognitive skills and critical thinking skills when applying their theoretical knowledge into practice. Moreover, students were able to attain value added skills, competency, thus get to learn and feel the experience like a real auditor who performs an audit task. Collaboration with audit experts also seen as essential. This strategy of embedding several learning innovations in a particular course would provide students with greater skill and confidence when they step foot in the real working world later.

Commercialization Potential

The learning model or technique for this course has high potential for commercialization in all learning institutions, with the aim to produce future ready auditors to the professional employment market. The 5-point Likert scale questionnaire adopted in this study also has the potential to be used in any other future studies.

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Helping Pedophilia Victims With 'I Care, You Deserve' Module

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Highlights: "I Care, You Deserve" Module is a module for pedophilia victims. This module has been developed based on the research findings on the effects of pedophilia to the victims. This module includes four main aspects which are spiritual, cognitive, emotion and behaviour. Pre and post-module on the psychological well-being level and the victims' behaviour changes observed have been done to test the effectiveness of the module application. The results show that this module is helpful in providing positive improvement to the victims for their well-being and for them to have hopes in their future.

Key words: pedophilia; trauma; well-being; module;

Introduction

National concerns about pedophilia have grown recently because of recent high-profile cases. Recent media attentions by television and newspapers has fueled fears about children's liability to sexual offenders. The issues of Richard Huckle who sexually abused up to 200 Malaysian children between 6 months and 12 years old, while doing voluntary work here has triggered the attention of the whole nation. As a result, campaign onto avoid and alert on the Pedophilia and Child Sexual Abuse have been aired and showed every day with the enactment of Sexual Offences Against Children Act 2017.

Table 1.0: Children in Need of Care and Protection by Type of Abuse and Sex, 2010-2016

Year	2010		2011		2012		2013		2014		2015		2016	
Abuse	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Sexual	66	871	78	789	55	908	64	1029	60	924	57	921	56	978

Source: Department of Social Welfare, 2010 – 2016

M : Male Children

F : Female Children

Table 1.0 shows the number of children in need of care and protection under Department of Social Welfare by type of abuse and sex from year 2010 until 2016. The number shows that, sexual abuse demonstrates high number of victims in every year, and female victims are more prominent than male victims. Previous studies show that the effects of sexual abuse are different between a victim and another (Hall & Lloyd, 1993; Araji, 1997; Crosson-Tower, 2002). Among short-term effects are appetite disorders (Nor Shafrin, 2007) and sleep disorders (Chen & Laura et. al, 2010) depression and guilt (Townsend, 2013), embarrassment (Muhammad Shariff & Nur Diyana, 2012), discipline (Cheah & Yuen, 2016) and running away from home (Browne & Finkelhoor, 1986). For long-term effects, the victim shows depression (Sigurdardottir & Halldorsdottir, 2018), fear (Hall & Hall, 2011), social isolation (Townsend, 2013), difficulty in believing other person and the increased risk of becoming a victim of abuse (Alexander et al, 1989).

With regard to all negative effects of child sexual abuse, early intervention can prevent the consequences of early adversity. A study by Nor Shafrin (2008) and Muhammad Shariff & Nor diana (2012) stated that the victims of pedophilia and child sexual abuse need to receive specific and effective helping services. However, the only helping approaches for pedophilia and child sexual abuse victims found are from western researchers such as Curtois (1999), Herman (1992), Chu (1998) who are focusing on behavior and cognitive changes, and those approaches are not designed specifically suit to Malaysian norm and society.

As such, Malaysia should have specific module for helping the victims that suit our norm and community for their well-being. The module is hoped to reduce the effects to the victims for their well-being.

Content

Project or innovation objectives

The objectives of this project are to identify the effects of pedophilia to the victims and determine the level of victims' well-being. Then it is to develop the "I Care, You Deserve" module for victims' well-being and to test the effectiveness of the module to pedophilia victims.

NALI approach implemented in the research (e.g. novelty, creativity, innovativeness, applicability and impact)

Innovativeness

"I Care, You Deserve" module is a module that suit to Malaysian norm. It has been developed based on findings on the effects of pedophilia to the victims. This module incorporates four aspects which are spiritual, cognitive, emotion and behavior. The pre and post module have been done to identify the effectiveness of this module to the victims. The result shows positive improvement on the victims. Further, this module will be integrated in a web-based system for public self-help desk.

Applicability

This module has been verified by the experts with mean of 7.24. This module is suitable to be applied by counselors, guardians, teachers and trainers and shall benefit the victims, government and society.

Impact to Students' Learning

This module is helpful in providing more meaningful life to the victims, with the improvement on their well-being level. After the application of the module, the victims are observed as more cheerful and living a more positive life. They admit that they are more focus in study, for their hopes and ambition for future.

Research Methodology

This study is a combination of quantitative and qualitative method. It involves three phases which are; first phase (library study and pre-module), second phase (design and development of module) and third phase (running and testing the module – post module). During the first phase, respondents are required to participate in an open-ended interview to examine the effects of pedophilia incident to themselves. After that, quantitative method took place whereby the respondents are required to answer Psychological Well-being questionnaire to identify their level of well-being. Later, on the second phase, based on the findings from the first phase, the module is designed. After the module has been developed, it has been verified by the experts. After that, the third phase began which is running and testing the module. From the 21 respondents, researchers have selected 12 respondents that show the most critical effects and the lowest well-being. There will be a group counselling based on the designed module. Then, researchers identified the effectiveness of the module through three instruments which are i) Interview with the respondents, ii) Pre and post questionnaire answering Well-being questionnaire. This is to determine the difference of score in term of their well-being and iii) Observation by the officer of "*Pusat Perlindungan Kanak-kanak*" on the victims, before and after the application of the module.

Finding and discussion of the project or innovation

Results on the effects of pedophilia to the victims show that the effects varied from physiology, cognitive, emotion and behavior.

Results on the interview of the respondents show that all 12 respondents admit that they are having more positive life after the module application. They are more focus and started to have hopes and ambition for their future. Their spiritual, cognitive and emotion are also improved and these influence to their behavior. Other than that, their physiology such as sleep disorder, appetite disorder and back-pain have improved.

Results on the observation indicates that officers from *Pusat Perlindungan Kanak-kanak* agree that respondents show more positive behavior after the module application. Discipline problems caused by respondents has reduced. Respondents who are like to isolate have change themselves in their social life with friends and the staffs. They like to participate in activities and are more focus in study.

Results on the level of victims' well-being of each of the well-being component as table 2.0 below:

Table 2.0: Victims's well-being for each well-being's component

No	Component	Pre	Post	Remarks	Position
1	Autonomy	0.06	0.50	Increased	3
2	Environmental Mastery	0.38	0.52	Increased	6
3	Personal Growth	0.32	0.69	Increased	4
4	Positive Relation with Others	-.07	1.16	Increased	1
5	Purpose in Life	0.59	0.74	Increased	5

6	Self-acceptance	0.41	1.45	Increased	2

The table shows all components in well-being are increased after the application of module. The highest increment is in positive relation with others, followed by self-acceptance, autonomy, personal growth, purpose in life and environmental mastery.

These results shown are suitable to the researches by Nelson et. al., (2007) on the importance of early intervention for self-recovery. Zahyah (2008) claimed, in order for the children to experience a healthy growth, psychological and sociological aspects of the children should be filled. In addition, according to Shonkoff and Philipp (2000) and Phillips, McCartney and Sussman (2006), for individual's success in school, workplace and community, the emotional and physical health, social skills and cognitive-linguistic capacities that arise during childhood years are crucial. To add, science shows on the requirement of a children including on the things they need to be protected from, in order to encourage their healthy development. In order to provide lifelong benefits for behavior and both physical and mental health, the children need a stable, responsive, nurturing relationships and rich healthy learning experiences during their childhood years (Shonkoff & Richmond, 2009).

Other relevant information (e.g. commercialization potential, awards received (title of project, exhibition and year))

This module has potential to be commercialized since it has been copyrighted. Suggested price for this module is RM300.00 each.

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Using Competitions to Nurture the Leaders of Tomorrow

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Highlights: Proton X70 Intelligence that Inspires Challenge is a three-stage challenge required the participating teams to develop a marketing plan to maintain the leading market position of the X70 as well as explore how the automaker can create a better engagement with the public. With over 100 teams nationwide in Malaysia, Fabulous team from Azman Hashim International Business School won the 6th place out of 12 teams and cash RM3000 with proven high reliable market research data and creative marketing plans. In addition, Fabulous team conducted a community relation (CR) activity to improve the brand perception of Proton, particularly Gen Y.

Key words: Proton X70; Marketing Plan; Competition

Introduction

UTM has formalized collaborations with the industry in terms of teaching and learning, curriculum development, consultancy and research and development. In order to accelerate students' skill development and employability, the practices should include industry players. One of the practices is competitions organized by industries. Thus far, students from Azman Hashim International Business School (AHIBS) participated in Proton X70 Intelligence that Inspires Challenge and Youth Eco-Port Challenge 2019 to increase leadership and graduate employability by equipping them with current and future-ready skills. The Proton X70 Intelligence that Inspires Challenge is used for the example of discussion.

Proton X70 Intelligence that Inspires Challenge

The three-stage challenge required the participating teams to develop a marketing plan to maintain the leading market position of the X70 as well as explore how the automaker can create a better engagement with the public. To be crowned as champions, contestants had to plan and deploy their campaign for the X70 in the city where their university is located in, as well as organized and executed an entire community relations event in their respective city and/or districts. Proton X70 was used as a platform for charity purpose. In addition, they were also tasked with preparing an executable sustenance plan that cements the SUV's sales leadership in various cities across Malaysia. Proton CEO Li Chunrong found that competition is vital to unearth hidden gems and said "I strongly believe that leadership is cultivated from a young age, and so through this competition we hope to provide the opportunity to our next generation of leaders from established universities in Malaysia to shine on a national level and equip them with the skill-set to excel in the corporate world."

Fabulous team consisting of six undergraduate students and one lecturer from AHIBS UTM participated in the Proton X70 Intelligence that Inspires Challenge. The students from Bachelor of Management (Marketing) included Ngang Jin Ming, Lee Chin Thing, Toh Chin Wei, Sharon Yeak Hui Yee, Lam Wing Fai and Lai Pei Yin and they were guided by Dr. Thoo Ai Chin. In elimination round, Fabulous team won RM1000 cash prize by preparing a comprehensive profile of consumers who have intention to buy Proton X70 in Malaysia via market survey. The market survey has a total of 764 valid responses obtained from both manual and online methods. The findings found that most of the potential buyers of Proton X70 are male, Chinese, 31 to 40 years old who earn from RM4001 to RM6000 with Bachelor Degree education qualification. In addition, the market research was conducted to understand the factors that drive purchase intention of Proton X70 in Malaysia.

In semi-final round, Fabulous team conducted a community relation (CR) activity to improve the brand perception of Proton, particularly Gen Y. The CR activity was conducted in UTM Johor in collaboration with Proton Edar Larkin and Handicapped and Mentally Disabled Children Association Johor Bahru on 18 May 2019, Saturday from 4pm to 6:30pm, located at UTM Tasik Ilmu in conjunction with Bazaar Ramadhan. The theme of the CR activity is "Proton X70 Intelligence that Inspires Caring".

In order to stimulate more UTM community and public to be part of the "Proton X70 Intelligence that Inspires Caring", Proton X70 was used as the main platform for the CR activity. A poster was created for those who came to donate the food, groceries or money, they were entitled to take photo with Proton X70 and were rewarded with a piece of instant photo. Fujifilm Instax Mini 9 was used for the photo shooting. However, the free photo shooting with Proton X70 was limited to the first 100 participants only. In this sense, Proton X70 was used as the caring platform to help the less fortunate community. A total of RM4341.85 cash was collected for the Handicapped and Mentally Disabled Children Association.

A quick brand perception survey of Proton X70 was conducted during the CR activity using Proton X70 as the caring platform in UTM. Out of 138 respondents who were intercepted, 92% of them rated good for the Proton X70 explore and experience roadshow in UTM. 70% of the respondents agreed that Proton X70 has better quality than other brands, 72% of the respondents agreed that Proton X70 offers the best price in the Sport and Utility Vehicle (SUV) market, 58% of the respondents agreed that they are interested to purchase Proton X70 in future and 67% of the respondents agreed that they will recommend friends to purchase Proton X70. The results show that community relation activity conducted in UTM is able to improve the brand perception of Proton, particularly for Gen Y, as more than 80% of the respondents belong to Gen Y. Using the community relation activities, Proton can continuously engage with community and to allow Proton X70 to prove itself: see, experience and hear to believe.

In final round, market survey was conducted in nationwide. Based on the results of market survey, only product, price and place are important to influence consumers' purchase intention of Proton X70. For product elements, customers emphasize on safety features of Proton X70, for price elements, customers agree that Proton X70 offers the best price in the market whereas for place elements, customers indicate that best service provided by Proton service centre is crucial for their purchase. Since product, price and place are critical factors that affect consumers in Malaysia to purchase Proton X70, therefore Fabulous team proposed several key strategic recommendations and implementable marketing plans to promote Proton X70. The nine key strategic recommendations and implementable marketing plans proposed by Fabulous team included organizing National Day Proton X70 Car Parade, Proton Application advancement, virtual reality technology, collaboration with TV programs, building buyer-seller relationships through Proton X70 Official Fan Club, Proton X70 Photo Contest, continuously engaged with community through Community Relation activities conducted in universities and colleges, collaborate with UTM for marketing projects using Memorandum of Understanding (MoU) as well as roadshows at strategic locations aim to maintain Proton X70 as the first place in the SUV market.

Conclusion

New Academic Learning Innovation (NALI) model is the concept of blended learning to create more meaningful and active learning experience using innovative teaching approaches with the aid of digital teaching materials. As proven, student-centered learning environment using constructivist theory could increase students' motivation, critical thinking and learning (Moustafa et al., 2013). As such, in order to improve the quality of teaching and learning in higher education institutions, the Proton X70 competition focused on student-centered teaching methods using problem-based learning (PBL) and project-based learning (PjBL). PBL aims to expose students with real-world problems and it is useful to enhance students' higher order thinking, dispositions, behavior, and attitudes about learning (Burris and Garton 2007). Whereas, PjBL allows students to solve a problem by completing a project.

By incorporating industry-based skills into education, students could be empowered with the competency they need to thrive when pursuing their career. The student-centered learning approaches using competitions, project based and partnership enable students to deep dive into business needs, meet top management and develop practical solutions to industrial issues. By working on projects, students develop critical skills including teamwork, creativity, communication and critical thinking. As a result, graduates who are holistic could stand out among their peers when entering the workplace. Now, a mismatch of skills required by the industry has always been the root of unemployment. Also, the advent of the 4th Industrial Revolution (4IR) has increased the complexities of employment. Therefore, it is crucial to enhance students' industry exposure via competition.

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Pirate of Word King: A Basic English Learning Mobile Application Prototype for Learners with Dyslexia

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Highlights: Dyslexia is a language-based disability that affects one's ability to read, spell and write. Mobile learning application, a multisensory game-based learning approach is appropriate to be used in teaching children with dyslexia. "The Pirate of Word King" learning application is developed to address the needs of students with dyslexia in acquiring the language skills. This product emphasized on the learning of Year 1 and 2 KSSR English and aimed to promote reading, spelling and writing skills among dyslexic students. Meanwhile, the product provides an interactive and engaging learning experiences for the learners.

Key words: mobile application; teaching and learning; dyslexia

Introduction

Dyslexia is a common specific learning disability that involves difficulty reading due to problems identifying speech sounds and learning how they relate to letters and words (decoding). It is a language-based disability irrespective of low-level intelligence (Chong et al., 2018). It is characterized by difficulties with accurate and/or fluent word recognition, letters sequencing in words or words in sentences as they tend to omit or add letters or words during reading or writing texts (Stein, 2018; Tsali & Alexiou, 2016). As reported by Madeira, Silva, Marcelino, and Ferreira (2015), it is estimated that 17% of the global population suffering from some degree of dyslexia.

Reading and writing are two main barriers for children with dyslexia (Ndombo, Ojo, & Osunmakinde, 2013). Children with dyslexia have difficulties in word recognition, discriminate and manipulate sounds correspond to letters and blending the sounds of all the letters together to form a word (Alt et al., 2017). Past research suggested that lacking organizational skills and short-term memory make children with dyslexia impaired in sequencing letters in words or words in sentences (Alsulami, 2019). As children with dyslexia obviously impair in mastering segmentation skills, therefore they also encounter the difficulty in spelling task.

Children with dyslexia need a different approach to learn literacy compared to normal children. Instructions employed in the classroom should focus on phonics approach and dyslexic children need to be taught slowly from easier tasks such as associate letter and sound (grapheme-phoneme) to complex tasks, such as blending and segmenting (Colson, 2013). Most of the teachers are still using a conventional teaching method or teacher-centred approach to teach students with dyslexia. Typically, conventional teaching method seldom apply teaching tools such as digital technology-based teaching supplies to engage students which makes the teaching and learning process not interactive and enjoyable. To date, there is no standardized module or curriculum in teaching phonics for students with dyslexia in Malaysia.

Game-based learning is the prevalent approach adopted by educators by integrating games into teaching and learning. Integration of games into learning instruction provide interesting and motivating learning experience which could enhance the higher achievement among the learners (Lucht & Heidig, 2013). Mobile devices and technologies have seen a rapid growth in the 21st century and mobile learning (M-Learning) may become the indispensable learning tool to improve children learning process and minimizes their failure particularly in children with dyslexia. Game-based learning by adopting mobile application has been shown as an effective learning approach. Some studies even provided empirical evidence that game-based learning outperformed conventional instruction approaches especially for language learning (Dawson, Antonenko, Lane, & Zhu, 2019; Skiada, Soroniati, Gardeli, & Zissis, 2014; Wouters, Van Nimwegen, Van Oostendorp, & Van Der Spek, 2013) as it provides new, engaging, and innovative ways to enhance children's learning (Ninaus et al., 2019). Therefore, there is a need to develop a mobile application that can optimize the dyslexic students' language learning through game-based learning in Malaysia context.

Content

Students with dyslexia in Malaysia are increasing year by year from 2013 to 2017. According to the data from Kementerian Pendidikan Malaysia (KPM), there are 12,266 students with dyslexia in Malaysia. Students with dyslexia below 12 years old (primary school students) account for over 50 percent of the total amount. Game based learning has been proven to support learning specifically for students who have learning disorders such as dyslexia (Berkling,

2017; Cidrim, Braga, & Madeiro, 2018; El Kah & Lakhouaja, 2018)as it creates a fun, motivating learning experiences as well as promotes problem-based experiential learning (Pereira & Rodrigues, 2013). Thus, this project is aimed to design a mobile application which known as "The pirate of word king" to assist students with dyslexia in promoting their reading, spelling and writing skills in English.

In this application, the user in this game is as one of the members in the pirate team who helps to pirate king to find the lost gold in one of the five islands. There are five modules which located in five different islands, namely start with Short Vowel Sound Island, Long Vowel Sound Island, Consonant Island, R-controlled Vowel Sound Island and Diagraph Island. In each module, there is learning session for letter-sound correspondences and exercises (letters and sounds, blending, segmentation, spelling and writing) in game format to test the user understanding of phonemes. Difficulty of practice will increase from Short Vowel Sound Island to Diagraph Island. As the child has completed a module, the child will get a hint. The child will get five hints as complete the five modules and the child will guess where the gold hides base on the hints given. Due to the child will repeat use this application, gold hiding place will be different.

Mobile applications emphasize on language learning has major market potential and currently there are quite a number of mobile applications had been developed to assist children in improving their efficiency in English (Yeo & Lim, 2019). Nevertheless, the systematic review of learning application for dyslexic children had indicated that the available mobile applications in the market rarely integrated the functions of reading, spelling and writing. Hence, one of the novelties of this prototype is that the users are able to develop reading, spelling and writing skills when they are using this application to learn phonemes. Moreover, this is the first mobile application developed based on the Kurikulum Standard Sekolah Rendah (KSSR) syllabus which address the learning needs of Malaysian students with dyslexia.

Table 1. Comparison of the developed mobile application with other mobile applications in the market

Mobile applications	Integrated reading, spelling & writing functions	Provision of performance summary	Built-in learning & practice session	Android & IOS operating systems	Aligned with KSSR curriculum
The pirate of word king	√	√	√	√	√
Intro to letters	x	x	√	√	x
Easy dyslexia aid	x	x	x	x	x
Starfall ABCs	x	x	√	√	x
Dyslexia quest	x	√	√	x	x
Spell better	x	x	x	x	x
Eye games, Dyslexia	x	x	x	x	x
Dyslexia learn letters	x	x	x	x	x
First words deluxe	x	x	x	x	x
Magnispies	x	x	x	x	x
SpellingCity	x	x	x	√	x

In order to engage the learners effectively, the research team had incorporated a "pirate treasure-hunting" theme into the mobile application which amazes the learners with interesting story line and challenge the learners to complete the tasks with meaningful learning activities in order to retrieve the lost gold. From innovativeness aspects, this mobile application extends the available mobile applications in the market by extending the user's learning experiences that covered three critical aspects, namely reading, spelling and writing skills. As mentioned earlier, almost all the mobile applications in the market did not considered integration of all three skills into a single mobile application, thus our product compensated the gap in the market. In addition, this product provides a summary of user's performance after the user finished a task in practice. Therefore, the users able to know their own strength and weakness with respective to the task. Apart from that, it may help teacher to devise strategy to improve the user's language skill based on the performance summary.

Figure 1. The learning activities of The Pirate of Word King mobile application

This project had employed ADDIE model which has five phases in designing and developing the mobile application, "The Pirate of Word King". Firstly, the researchers conducted investigation on the characteristics of children with dyslexia, teaching strategies using by special education teachers, syllabus and contents for English Language and interface design of mobile application. After the researcher analysed the data obtain in analysis phase, the researcher designed the interfaces of mobile application and identified the contents to be included. As this mobile learning application is designed for students with dyslexia in primary schools, hence the mobile application emphasized on the Kurikulum Standard Sekolah Rendah (KSSR) syllabus and the needs of students with dyslexia. In the development phase, prototypes that comprised of audio and video files for graphemes and words, animation and programming are created, reviewed, evaluated and improved continuously. The prototypes will be verified by experts in contents (instructional / gaming activities in graphemes-phonemes, pronounce, segment, spell a word and reorganized words into correct sentence) and interface design before the children with dyslexia used it as a learning tool. In later phases, the feasibility of the mobile application will be tested through experimental design. Paired sample t-test is used to determine whether there was a significant difference between pre-test and post-test results in each group. The researcher will conduct the evaluation to identify the functionality and compatibility of this mobile learning application after using by the students with dyslexia. The beta version of the product application will be released after the mobile application is improved based on the results of the pilot study.

As mentioned above, the number of dyslexic students in Malaysia is increasing significantly informed the demand of the students with dyslexia and mobile users for a mobile application that helps the learners to acquire literacy skills. Thus, the mobile application could have a good potential in commercialization. Apart from that, there are limited local products similar to this product as this product is targeted on primary school students according to the KSSR English Language syllabus year 1 and year 2. Up to date, there are limited products of educational mobile application in market which encompass all three aspects (reading, spelling and writing). The existing mobile learning application in market only highlighted either one aspect or two aspects of language skills. In order to attract more users, the mobile application able to run on both Android and IOS system since these two operating systems are the most commonly operating systems of the mobile devices.

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Enhancing Interest in Learning Pythagoras Theorem Among Lower Secondary School Students in MESTECC Mentor-Mentee Program

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Highlights: The mentor-mentee program is a service-learning activity that designed to create engagement among university lecturers, postgraduate students and school students in learning Mathematics. A module is created for the low secondary school students. This program aims to inspires students' passion in learning mathematics and develop students' life skills such as problem solving, communication and thinking skills through gamification and learning activities in learning the Pythagoras Theorem. Significance impact can be found among the students where the students love to learn mathematics after joining the MESTECC mentor mentee program.

Key words: Learning Mathematics; mentor-mentee; service learning

Introduction

Mentoring is known as a learning method where it encourages comfortable relationship between mentors and mentee as an instrument to develop group and individuals' potentials in carrying out particular duties and responsibilities, familiarise themselves with new techniques, and caring for all aspects of mentee. Education in Malaysia is promoting the Implementation of Science, Technology, Engineering, and Mathematics (STEM) programs which designed to attract the interest and awareness of students and aim to increase the number of students that enter graduate programs in STEM at school and tertiary levels (Halim, Soh & Arsad, 2018). Further, Halim et al also stated that study by Shahali et al (2017) has showed that outreach programs in Malaysia, which are gaining in numbers and participants from industries, universities and NGOs, are able to excite and engage students in STEM and students are able to develop the STEM knowledge and skills. Thus, mentor-mentee program in STEM has been developed and introduced by the Ministry of Education as a step in shaping the human capital development as well as promoting sciences and mathematics.

In our designed module for learning Pythagoras Theorem, activities that related to topics such as hands-on and minds-on lessons for the students. In the introduction of the topic, facilitators will provide guidelines, motivation for the topic. Also, sharing the importance of mathematics and sciences in daily life problems by giving examples of the mathematics application relating to real-life are shown to the students. Active learning activity is implemented in this program to improve the student's problem-solving skills and critical thinking which based on real-life situation/event. During the program, data collection had been done from pre-test, post-test and survey forms to assess the effectiveness of the program. From the survey form, the students need to answer questions that related to the level of their understandings on the basic concept, knowledge as well as application throughout the module of Pythagoras Theorem. The effectiveness and efficiency through the mentor mentee program can be observed. Significance impact can be found among the students where the students love to learn mathematics after joining the program. After the program, the results in survey form are statistically analyzed to present the conclusion of each finding in this program. The program has increased the collaboration among secondary school students, teachers, university students and lecturers. This is a successful service-learning program that received positive feedback from students and

teachers. The students have been exposed to the importance of mathematics in real life. They are also prepared to pursue their future studies in tertiary education.

Learning Pythagoras Theorem in Mentor-Mentee Program

In this STEM program, a module is developed to provide opportunities for school students to gain 21st-century learning skills and experiencing students centered learning processes through gamification and active learning activities. The activities of the program are leaded by UTM's lecturers and postgraduate students. Based on the feedback from school teaches, Pythagoras Theorem is one of topics in subject of Mathematics that the school students have been seen to struggle with the most. Through the modules and STEM program, the school students can learn from a multidisciplinary point of view. The Figure 1shows the learning of Pythagoras Theorem through active learning and team working.

Figure 1: Learning of Pythagoras Theorem through active learning and team working

The implementation of the Pythagoras Theorem STEM program is to strengthen Science and Mathematics in schools and to motivate the student the importance of mathematics and sciences in real life. In this Mentor-Mentee Programme for Pythagoras Theorem, UTM lecturers playing roles as facilitators preparing the modules and the postgraduate's students are guided to prepare the activities for active learning. Therefore, there are mentors which consists of a group of UTM postgraduate students and the mentees are school students from SMK Nusajaya have participated in this programme. In this module, the lecturers will give a brief explanation on the Pythagoras Theorem and mentors will help and guidelines for gamification and learning activities in learning the Pythagoras Theorem. Also, sharing the importance of mathematics and sciences in daily life problems by giving examples of the mathematics application relating to real-life are shown to the students themselves. Besides, the mentees learn the Pythagoras Theorem through some games together with the facilitators and their mentor. Besides, the students were guided by the mentors to work in group for problem solving.

This program aims to inspires secondary school students' passion in STEM and develop their life skills such as problem solving, communication and thinking skills. The effort is to produce young Malaysian (the mentors in this STEM program) who are knowledgeable, skilled, noble, responsible, and capable of achieving their well-being and contribution to harmony and prosperity of society and the nation. So, mentor-mentee program has been developed and introduced by the Ministry of Education and MESTECC as a step in shaping the human capital development. The role of mentor for this program is to mentor a group of students from secondary schools to innovate using technology, to solve real-life challenges. The knowledge sharing and active learning in the subject of Pythagoras Theorem are conducted by the mentors which guided by UTM lecturers in the schools to benefit the school students. This is also a voluntary work by postgraduate students and lecturers that intend to initiate the interest of secondary school students in the subject of Mathematics.

Furthermore, the main purpose of this program is to strengthen Science and Mathematics in schools and to alert the student regarding to the importance of mathematics and sciences. In this service-learning programme for learning

Pythagoras Theorem, the facilitators emphasizing the two-way communication in the learning process between mentors and mentees. Th instructors facilitated the sharing and discussion among students to figure out the importance of mathematics and sciences in daily life problems. In this mentor mentee program, the students can find out some examples of the mathematics application that closely related to their real-life. This program which promoting active learning activity in mathematics is effective in improving the student's problem-solving skills and critical thinking which based on real-life situation/event. This and self-directed learning program can be continuously conducted in different secondary schools in Malaysia to endure the impact of the knowledge transfer in the subject of Pythagoras Theorem, besides, the adaption of this mentor-mentee can be done between university lecturers and school teachers.

Significance impact can be found among the students where the students love to learn mathematics after joining the MESTECC mentor mentee program. This program increases the understanding and collaboration among secondary school students, teachers, university postgraduate students and lecturers. This is a successful program that received very positive feedback from students and teachers. The students have been exposed to the importance of mathematics in real life activities. They are also prepared to pursue their future studies in tertiary education. The students are seeming more confidence to learn Mathematics in the future. From the survey results after the program, overall mentees said this module helpful and interesting. 95% of the mentees said that the facilitators and mentors present the topic effectively and the activities help them to understand topic better. In face-to-face interview sections after the program, the students are excited to look forward the next series of mentor mentee program. It is seen that after attending the program, the percentage of students said that their knowledge about Pythagoras theorem is improved.

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Development of Entrepreneurs via Social Media Marketing Service Learning

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Highlights: The Entrepreneurship & Marketing Technology '19 (EMT 2019) project was an entrepreneur development program through digital transformation organized by the lecturers and students of Universiti Teknologi Malaysia through service-learning program. This program has exposed 25 SMEs to the basics of digital marketing using social media Facebook platform. By applying the NALI service-learning approach, three marketing modules were creatively presented to all the entrepreneurs by 23 "e-buddies" who are UTM students and 5 "e-facilitators" consisting of UTM entrepreneurship lecturers. As a result, there was an increase of RM 2,000 to RM 5,000 income per business in the first 6 month.

Key words: social media marketing; service learning; copywriting

Introduction (Project or Innovation)

With the aim of exposing small and medium entrepreneurs (SMEs) on how to manage business brands and apply effective marketing strategies on social media, the Entrepreneurship & Marketing Technology '19 (EMT 2019) project with a concept of entrepreneurship development through digital transformation has been organized by the lecturers and students of Universiti Teknologi Malaysia through service learning program. This project is a collaboration between lecturers and students of the Social Media and Branding course for the co-curriculum component, entrepreneurship lecturers from Azman Hashim International Business School (AHIBS UTM), Co-curriculum and Service Learning Unit (CCSL UTM) and Academy of E-Sport (AOES), Nusajaya. The program has attracted the participation of 25 local small entrepreneurs who have little or no basic knowledge of building a FB Page for a business. This program has managed to expose the entrepreneurs to the basic knowledge of digital marketing through social media platforms such as Facebook as a business platform.

Content (Project or Innovation)

Project Motivation

The growing population of entrepreneurs who are not technology savvy, do not have any technology-based education background or competency has resulted in many businesses not leveraging the technology effectively to attract customers. This becomes a big loss to their businesses as they are not able to gain high profits through online platforms. In specific, entrepreneurs have difficulty or little exposure to the best practices or techniques in using social media effectively as a marketing tool that can assist with business plans as well as branding their business. With the implementation digital entrepreneurship programs that are offered at affordable or no fees at all, this can educate Malaysian small and medium entrepreneurs (SMEs) to deepen their business knowledge by learning from the professional and expert parties such as the university community. It is hoped that with this effort, academicians and scholars are able to share important knowledge with the public on the implementation of effective business strategies in general and therefore drive the business to continue ahead and thrive on.

Project Objectives

Entrepreneurship & Marketing Technology '19 (EMT 2019) aimed to provide clear knowledge and understanding to entrepreneurs, especially those who have problems or issues in implementing effective strategies for marketing their businesses using social media technology. The digital marketing strategies shared during this service learning are based on the 5P-concept; namely Perhati (Observe), Pisah (Segregate), Pelan (Plan), Praktik (Practise), and Pantau (Monitor) that was developed by the Social Media and Branding course lecturer, Dr. Zuraidah Sulaiman. This service learning program includes one-to-one hands-on learning sessions, sharing of marketing theory on social media and the basics of using a Facebook business page, along with convincing copywriting techniques or advertising and promotional sentences to attract users on social media. In this program, there were 3 modules taught to entrepreneurs;

- Module 1: Effective social media marketing strategies
- Module 2: Basics in setting up a Facebook Business Page
- Module 3: The basics of copywriting in social media

Implementation of NALI Approach and Methodology

By applying the NALI service learning approach, the three modules above were creatively presented to all the entrepreneurs by the lead facilitator, Dr. Zuraidah Sulaiman, with the assistance of a set of 23 "e-buddies" who are UTM students and 5 "e-facilitators" consisting of UTM entrepreneurship lecturers. For the e-buddies UTM students, this service learning program has exposed them to real scenario of working on the field by giving them the opportunity to impart their business knowledge and social media marketing skills gained in the classroom to the real public. This is a novelty and innovativeness in delivering knowledge to students effectively as compared to traditional way of assessing student's mastery of a certain knowledge via cognitive assessments such as examination, quiz, and slides presentation in class (Yorio and Ye, 2012). This service learning program which creatively been conducted has definitely broadened the students' horizon (Halberstadt, Timm, Kraus and Gundolf, 2019) whereby they were actually able to train real entrepreneurs on the much sought-after skills like digital marketing. In specific, this service learning program has impacted the students as follows:

- Providing the students with opportunity to help optimize real entrepreneurial businesses through online advertising in Facebook (FB Ad)
- Giving the students a chance to build awareness on managing business branding through digital marketing
- Training the students with proper marketing knowledge by exposing them to real business problem and challenges faced by the entrepreneurs
- Allowing the students to gain business experience by meeting, interacting, and mingling with the entrepreneur community

During this service learning, business strategy explanations and marketing tips as well as hands-on were given so that the participants really understood on the effective use of FB Pages, FB Ads and copywriting (Fink, Koller, Gartner, Floh and Harms, 2020). The goal whereby some of the participants who have aimed for their FB Pages to be more tidy and beautiful to attract their customers has also been achieved. In that context as well, e-buddies have given their thoughtful academic opinions where they have suggested for effective advertising sentences or copywriting that can attract the interest of young and millennial generation customers who are in the same age segment as the e-buddies.

In addition, e-buddies have also taught the participants on how to design interesting logos, backgrounds, banners and postings to appear more attractive. The majority of the participants did not have the knowledge and skills on how to design interesting images or postings using *Canva* application. After being taught, participants become more confident to design their own marketing campaign tools without having to incur additional costs to hire the third parties or consultants to design their logos, backgrounds, banners and postings.

In a nutshell, this EMT'19 program has definitely had a positive impact on the entrepreneurs. For example, through this program, businesses have been optimized through online advertising within Facebook (FB Ads). At the same time, the service learning program has been successful in building awareness of managing brands towards targeted segments through digital marketing. The program has also benefited the entrepreneurs with a comprehensive exposure to proper basic marketing knowledge and tools essential to enhance their business competency.

Project Outcome and Award

As a result, a total of 25 small and medium entrepreneurs (SMEs) around Johor Bahru have been trained during this service learning program. From the follow up feedback that was conducted, there was a total increase of RM 2,000 to RM 5,000 income per business in the first 6 month period after the entrepreneurs attended the program. From the

post-survey questionnaire, there was an increase of over 85% both in general marketing knowledge as well as in social media marketing among the entrepreneurs. Also in that 6 month period after the program, a total of 23 out of 25 entrepreneurs involved in this service learning program were still adopting the social media marketing technique especially in Facebook that they learned during the program.

Due to the creativity, novelty and innovativeness in applying the service learning NALI approach, this project has been selected as the Gold Award winner for *Service Learning Award 2019 (Academic and Professional Cluster)* during the "Hari Kokurikulum UTM 2019" (Co-Curriculum Day) that was organized by the Centre for Co-curriculum and Service Learning (CCSL), Universiti Teknologi Malaysia.

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Be Still Project: Andragogy in Experiential Learning for A Good Cause

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Highlights: Be Still is a fundraising community project involving students and lecturer from Azman Hashim International Business School (AHIBS), UTMXcite, Persatuan Paliatif & Kanser Kanak-Kanak, Tunku Laksamana Johor Cancer Foundation and Wakaf An-nur. It aimed to develop the understanding of social entrepreneurship and create the public awareness on the challenges experienced by the patients. Fundraising activities were held at Hutan Bandar, Mutiara Rini, Johor Bahru and the team were managed to collect RM5,536. A fund-giving ceremony was held on 6 September at Pediatrics Palliative Care Unit, Hospital Sultan Ismail, Johor Bahru, Johor. This community project was organized by social entrepreneurship students, as part of their course requirement under the facilitation of Dr. Adaviah Mas'od.

Key words: social entrepreneurship; andragogy; experiential learning; fundraising

Introduction

This project was implemented as one of a class project for subject UHAS2012 Social Entrepreneurship. In understanding the social entrepreneurship in a real world, a brainstorming and idea generation session was held via group presentations in class in an open theme. Any social problems and situation can become one of the underlying basis on student's idea. The best idea then was selected as one of the main project for the class. Be Still is the idea shared by students, which the main idea is to come out with entrepreneurship activities to collect donations to fund for the unfortunate children with cancer. This unfortunate situation has motivated students to conduct business with an embedded social drive.

Besides to fulfil the group assignment given, this class project set learning objectives as below:

- To educate students on the concept of social enterprise and volunteering by developing a sustainable society for the unfortunate children.
- To be able to independently identify social problem and suggest an innovative and creative business concept using SBMC (Social Business Model Canvas).
- To increase students' confidence in assembling, dealing, and manage resources with multi-level stakeholders with their current and new networking with industry.
- To bridge and achieve the collaborative objectives in helping unfortunate children with multi-level stakeholders.

Novelty

The attributes of Be Still as social entrepreneurs project, should encompass entrepreneurial and managerial capabilities which bridge diverse stakeholder communities (Cope et al., 2007). As an experiential programme suggested and developed by students, the idea was to focus on income generation needs to bring together a number of different stakeholders who bring their respective knowledge, skills, resources and experiences to the project. In this study, the novelty lies in four stakeholders as stated:

1. Social entrepreneurs – who have the skills, knowledge and experience of the creation of social wealth such as a collaboration with Tunku Laksamana Johor Cancer Foundation. They have to want to share their knowledge with the students. The benefits they receive in return include the generation of funds, the opportunity to promote social values, as well as the ability to promote the cause of the enterprise itself.
2. Facilitators and participants – academic staff and students from the university (Azman Hashim International Business School) and UTM Center for Student Innovation & Technology Entrepreneurship (UTMXcite) with skills, knowledge and experience in facilitating the fundraising project management and educational event such as awareness program which held in Hutan Bandar Johor Bahru.
3. Individuals and businesses within the community who are prepared to support students' efforts to raise funds by providing funding themselves, or the resources or means to help students generate the funds such as collaboration with Wakaf An-Nur.
4. Target customer – The beneficiary of this project is the Persatuan Palliatif & Kanser Kanak-Kanak from Pediatrics Palliative Care Unit, Hospital Sultan Ismail, Johor Bahru, Johor.

Stakeholder play different roles in achieving the mission of this program. Nevertheless, each stakeholder will get specific benefit they aimed for such as to be responsible and giving back for the society (from the donation given), percentages from the donation to reinvest in promoting their organization and giving back with higher percentage of donation to the target beneficiaries, and higher education institution which really rely on social enterprises expertise and networking in order to experiencing the real issue and solve real problems. Thus, the novelty of this project is also lies on the risk-taker that take the challenges in re-invested the donation for better returns. Social enterprises usually will be linked to the free-risk type of enterprise as their business model is more on donation and fundraising activities only.

Creativity

This project was planned and developed by students using the Social Business Model Canvas (SBMC) as tools to concreate the social enterprise objectives in Be Still Project. This tool was used to support social innovators by designing their Social Enterprise plan. Social Businesses Model focus on the impact social enterprise create for beneficiaries rather than creating profits. SBMC is the reinvented Business Model Canvas (BMC). Yet, the BMC is limited by being focused only on commercial values and maximizing profit instead of creating social value. Therefore, SBMC was used in developing this project.

A Social Business Model Canvas provides a powerful visual tool to help with business model design. It's an adaptation of a well-known technique, first developed by Alexander Osterwalder (Pigneur, 2010). SBMC is the social business model canvas as highlighted with all of the elements which match with the development of Be Still project. SBMC for Be Still project is as depicted in Figure 1 below:

<table>
<tr><th colspan="5">SOCIAL BUSINESS MODEL CANVAS</th></tr>
<tr><td colspan="5">MISSION: To provide funds for unfortunate children with cancer in Persatuan Paliatif & Kanser Kanak-Kanak, Pediatrics Palliative Care Unit, Hospital Sultan Ismail, Johor Bahru, Johor.</td></tr>
<tr><th colspan="2">IMPLEMENTATION</th><th>VALUE</th><th colspan="2">MARKET</th></tr>
<tr><td>KEY ALLIES</td><td>KEY RESOURCES</td><td>SOCIAL INNOVATION</td><td>CUSTOMER RELATIONSHIP</td><td>CHANNELS</td></tr>
<tr><td rowspan="3">* UTMXCite
* Wakaf An-Nur
* Tunku Laksamana Johor Cancer Foundation
* Pediatrics Palliative Care Unit
* AHIBS
* UTMSpace</td><td>* Social enterprises knowledge
* Human Capital</td><td>* Re-investing the donation to double or increase funds or encourages more allies to participate.</td><td>* Social businesses/ enterprises
* NGOs
* Beneficiaries
* Organization
* Individual</td><td rowspan="3">* Facebook
* Instagram
*Online news</td></tr>
<tr><td>KEY ACTIVITIES</td><td>VALUE PROPOSITION</td><td>CUSTOMER BENEFITS</td></tr>
<tr><td>* Networking with all stakeholders
*Awareness Program
*Fundraising activities
Fund-giving ceremony</td><td> Meaningful cause to search for sponsorships and donations.
* Re-investing in awareness campaign and car booth sales for bigger funds.</td><td>*Different stakeholders (recipients, donors and organisation aims to reach and serve to achieve its mission such as social status, giving back and gain hands-on knowledge)</td></tr>
<tr><th colspan="5">FINANCES</th></tr>
<tr><td colspan="2">COST OF DELIVERY</td><td>COMMUNITY REINVESTMENT</td><td colspan="2">REVENUE STREAMS</td></tr>
</table>

* Fund-giving ceremony costs * Transportation * Logistics * Marketing	* 5% from money received via sponsorship will be re-invest for the sales and donation programmes and to attract more allies and stakeholders.	* Sponsors * Car booth sales * Donations from awareness of cancer program

Figure 1: SBMC for Be Still Project

Innovativeness

Experiential learning approaches have become increasingly common in entrepreneurship education in response to calls for different approaches to the traditional teaching approach. Previously the experiential learning in social entrepreneurship curricula can be considered as the best practices. This is because an experiential learning environment provides a better opportunity for students to discover the complexities faced by social entrepreneurs in develop the necessary knowledge and skills (Macht and Ball, 2016; Rae, 2009).

This pedagogy approach in experiential learning exposes students to the ideology of social entrepreneurs, the factors that contribute to market failure, the resource mobilization processes, performance factors, and the need to bridge multi-level stakeholders (Alvord, et al., 2004). The behaviours that should be observed include exploring new opportunities, taking risks, commitment to work, applying intelligence and determination (Caird, 1990). In fact, generating real funds for real social enterprises is a form of experiential learning in which business students, normally undergraduates, may not have been aware of the role of social enterprises or may not have considered career as social entrepreneurs (Collins et al., 2006). In many social entrepreneurship curricula, in and out of the classroom, the pedagogy revolves around academic development. Nonetheless, studies exposed that pedagogy is an education method in which the learner is dependent on the teacher for guidance, evaluation, and acquisition of knowledge, and could be unfit with to adult learners (Kickul et al., 2010; Bernier, Medrick, & Mitten, 2011).

Though, experiential learning can be divided into two learning methods which is pedagogy and andragogy. Supporting by researchers, the pedagogy is not really applicable for higher institution and much suitable for children learners (Bernier, Medrick, & Mitten, 2011; Ray, 2012; McNally, et al., 2020). Meanwhile, for higher institution and adult learner, andragogy is the better approach in teaching adult learners. It is important to note that the approaches of andragogy are considerably different than pedagogy. Andragogy have shifted away from pedagogy because of the realization that adult learning is connected to multiple social and personal vicissitudes such as working experiences, employment and technology (Savicevic, 2008). These arguments are fit with the meaning of pedagogy and andragogy itself: whereby the fields of andragogy are lying more to education of an adult, while, the field of pedagogy is lying in an education for children (Bernier, Medrick, & Mitten, 2011; Ray, 2012; McNally, et al., 2020).

According to Dr. Malcolm Knowles, andragogy follows these several essential principles (Makhlouf, 2019; Holton, Swanson & Naquin, 2001; Hartree, 1984):

1. Adults are self-directed
2. Adults use their past experiences as learning resources
3. Adults are motivated to learn in relation to their social roles
4. Adults prefer to learn solutions that can be applied in realistic situations
5. Adults rely on intrinsic motivations

Taking this argument into consideration, this class implemented the andragogy teaching method where it is fit better to the part time students of School of Professional and Continuing Education, (UTMSPACE) that have various background and experiences as they are working students and can be responsible and depend on self. This application of andragogy is when brainstorming and idea generation session was held via group presentations in class in an open theme. Any social problems and situation that being observed by students can be one of the underlying basis on student's idea. The best idea then was selected as one of the main project for the class. This approach was directed students towards self-actualization, gaining experience, and identify problem-solving (Bernier, Medrick, & Mitten, 2011: McNally, et al., 2020), without sacrificing the experiential learning in exploring new opportunities, taking risks in building enterprise, commitment to work with stakeholders, applying intelligence and determination at the same time (Caird, 1990).

Applicability

Social entrepreneurship education can increase the propensity of students to launch social enterprises through a process of andragogy in experiential learning which students co-create shared communities of practices with their own problem identification and problem-solving idea. It is in fact will increase students' intention for social entrepreneurial. This was being proven by research as participation in social entrepreneurship courses will increases self-efficacy, perceived social support, and social entrepreneurial intentions (Hockerts, 2018). Experiential learning requires collective and interdependent actions, which are inherently social in nature and which shape the understanding of learners through dynamic social interactions as well (Branzei & Fredette, 2008). Meanwhile, the andragogy approach in delivering the knowledge is much applicable for adult learners.

Impact

Experiential learning using andragogy had enabled students to create and experience this passion for themselves, thereby preparing them with the motivational and emotional resources they may need to be successful in the future (Gundlach, & Zivnuska, 2010). Free to give idea and develop their own social business model will give a positive impact to all stakeholders.

It is clear that andragogy can be highly motivational as well, as adult learners are more goal-oriented than younger learners; this is why offering them meaningful learning experiences can make a real difference in achieving learning outcomes is the main pillar of this project.

Andragogy inspires instructors to do a better job connecting learning experiences to what adult learners already know and experienced. Allowing for personal opinion, better pacing, and knowledge checks and re-checks, help adults leverage what they already know against the new topics they are presented with. Thus, the proses of acquiring knowledge are much interesting and long-lasting, which suit the notion of long-life learning in a higher education institution.

Exposing to a mix of collaborators, hands-on projects, and on social initiatives, will help students to accelerate their transition into a more meaningful career or gain the hands-on experience needed to launch a social venture in the future.

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We are grateful and would like to thank all stakeholders in this project; Azman Hashim International Business School (AHIBS), UTMXcite, Persatuan Paliatif & Kanser Kanak-Kanak, Tunku Laksamana Johor Cancer Foundation and Wakaf An-nur.

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Social Network Analysis for Interaction via Collaborative Problem-based Learning Environment (CPBL) to Promote Students' Learning Performance

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Highlights: Collaborative learning is believed can foster students' interaction and learning performance in many studies. However, traditional collaborative learning itself is lacking in inequalities roles and leads to inadequate time in class. Additionally, with problem-based learning and Web 2.0 tools such as learning management system seem appropriate to provide students with platforms to actively participate and contribute through online learning regardless of time and place. This is aligned with the theme of NALI 2020 which focusing on developing educators who could deliver education to everyone, anytime and anywhere, even during global pandemics and natural disasters. This study is carried out to investigate the students' interactions by utilizing Edmodo as collaborative problem-based learning (CPBL) platform to promote students' learning performance. A total of 34 students which consist of 20 students for treatment group and 14 students for control group took part in the study. Both groups are given pre-performance test and post performance test. However, only treatment group has to work in a small collaborative group and discussing with each other to solve the three problem based-learning tasks in Edmodo after pre-performance test session. The collected data were analysed using descriptive and inferential statistics and social network analysis (SNA). Findings in this study showed that treatment group is better than control group in learning performance. This finding suggests that interaction in CPBL can promote students' learning performance.

Key words: Interaction; Problem-based learning; Collaborative learning; Learning performance; Social network analysis

Introduction (Project or Innovation)

This study presents an innovative technique by applying Social Network Analysis (SNA) for interaction via collaborative problem-based learning environment (CPBL) to promote students' learning performance in one of computer science course in Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia. The course is typically delivered via lectures and face-to-face discussions. However, the innovative of this study applying interaction via online discussion in CPBL environment. The followings are the objectives of this teaching innovation:

1. To introduce collaborative problem-based learning tasks among students by incorporating real world problems face by certain people.
2. To encourage passive students to discuss actively via online discussion
3. To analyse the types of interaction patterns that occur in the collaborative problem-based learning environment that helps to enhance student's learning performance
4. To enhance students' learning performance via interaction in collaborative problem-based learning environment.

NALI implementation approach

NALI approaches implemented in the research are:

Novelty: An original teaching technique by applying Social Network Analysis (SNA) for interaction via collaborative problem-based learning environment (CPBL) to promote students' learning performance.

Creativity: Embedding collaborative problem-based learning environment (CPBL) to execute the given three tasks within a given time frame. The three CPBL tasks are presented in form of scenario video, Powerpoint slides and image respectively.

Innovativeness: Integrating students' learning process and performance by interact and having online discussion in small collaborative groups to solve the three problem-based learning tasks in Edmodo.

Applicability and impact: Problem-based learning tasks provide many opportunities for solving real problem scenarios with great discussion collaboratively with regards to the interaction learning process. Students learnt through prior knowledge, experience and interaction among themselves first before undergo real lecture. Hence, students' already obtain knowledge before in-depth understanding formal lecture in class that help them to enhance learning performance.

Research Methodology

The treatment group (*n* = 20) was given the pre-performance test, carried out three collaborative problem-based learning (CPBL) tasks in Edmodo, and finally sat for post performance test. Meanwhile, for control group (*n* = 14), participants were given pre-performance test, three non problem-based learning tasks that had to be carried out individually and finally post performance test.

Finding and Discussion

During the CPBL task as intervention, only discussions from the treatment group of students (*n* = 20) were analysed. The students' discussion post is analysed by using Interaction Analysis (IA) by Gunawardena, Lowe & Anderson (1997). There are 1247 coded meaning messages altogether. To observe the detail of types of interaction patterns that occur in the collaborative problem-based learning (CPBL) environment that promotes student's learning performance, social network analysis (SNA) is applied. There are 12 nodes of group analysis and 35 edges of overall tasks to represent the number of interactions among students' group in this CPBL platform. Nodes in this case are the students' CPBL group and IA coded messages. The details of the nodes are shown in Table 1. The edges are the linkages between each node.

Table 1: Nodes of social network analysis

Type of Node	Node	Description in this study
CPBL Group	G1	Group 1
	G2	Group 2
	G3	Group 3
	G4	Group 4
	G5	Group 5
	G6	Group 6
	G7	Group 7
Interaction Analysis (IA) coded messages	P1-Share	Sharing and comparing of information
	P2-Disagree	Stating disagreement
	P3-Nego	Negotiation of meaning
	P4-Experience	Discussing experiences or prior knowledge.
	P5-Summary	Summarize, apply and approve new ideas

Figure 1 shows the Fruchterman Reingold layout preview of SNA of total interactions by CPBL group of students. Generally, P1-Share node has the biggest node because it has higher degree indicating that all groups of students are interacting by sharing and comparing of information actively. For edges, there is one the thickest edges than others which the edges from Group 4 (G4) node to P1-Share node. The thicker edges are due to high number of sharing and comparing of information interaction of students in Group 4 in replying and responding message with each other during online discussion to solve the three CPBL tasks. This indicating that students in Group 4 have interacting the most with each other compared to the other groups for sharing and comparing of information.

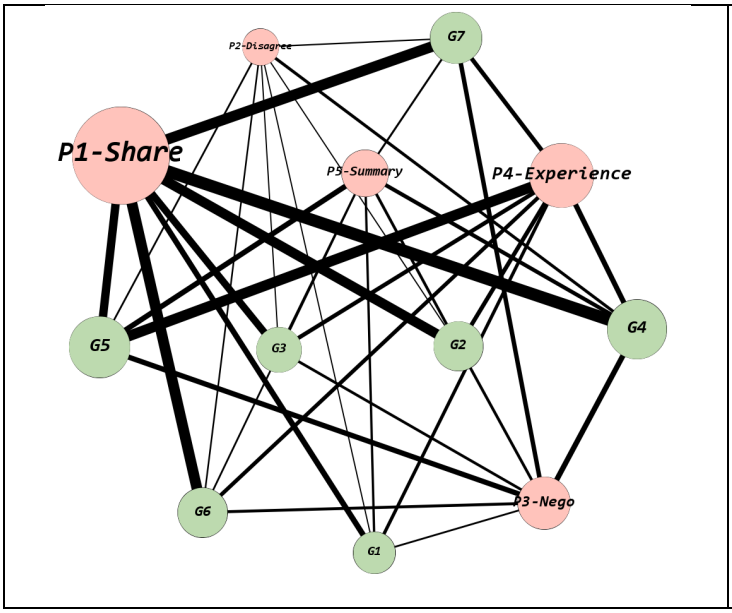

Figure 1: Fruchterman Reingold layout preview of SNA of total interactions by CPBL group of students

To investigate if there were any significant differences between the scores in control and treatment group, Mann-Whitney U test was chosen (Chin and Lee, 2008). The following hypotheses were set:

Null (H_0) Hypothesis: There is no significant difference between students' learning performance among treatment and control group

Research Hypothesis (H_1): There is a significant difference between students' learning performance among treatment and control group

When pre performance test score are compared between treatment and control group for significant differences using Mann-Whitney at a = 0.05 level of confidence, results in Table 2 shows that for pre-performance test, the treatment group (*n* = 20) and control group (*n* = 14) is statistically not significant, Mann-Whitney U = 132.00, p= 0.78 and null hypothesis was fail to reject. This indicates that both groups of students have similar prior learning performances when they were tested during pre-performance test session.

Meanwhile, when post performance test score are compared between treatment and control group for significant differences using Mann-Whitney at a = 0.05 level of confidence, results in Table 2 shows that, the scores for treatment group (*n* = 20) and control group (*n* = 14) is statistically significant, Mann-Whitney U = 18.50, p=0.00, hence the null hypothesis was rejected. It can be concluded that the treatment group performed significantly better in post performance test. This shows that the collaborative problem-based learning (CPBL) environment has effects on students' learning performance.

Table 2: Mean Pre and Post Performance Test based on Group of Students

Group	Total of Students	Pre Performance Test		Post Performance Test	
		Significant difference		Significant difference	
		Mann-Whitney U	Sig. 2-tailed (p)	Mann-Whitney U	Sig. 2-tailed (p)
Treatment	20	132.00	0.78	18.50	0.00**
Control	14				
** significant at the 0.01 level (2-tailed)					

Commercialization Potential

This innovative teaching technique has a high potential for commercialization. The learning activity will be applied for copyright registration. This learning activity can be marketed to all public and private institutions that offer suitable courses. It can also be targeted to Secondary schools and colleges.

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Industry-oriented Teaching and Learning Approach for First Year Electrical Engineering Students

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Highlights: The New Academia Learning Innovation (NALI) framework has been actively promoted to inculcate innovative teaching and learning practices in education. The current abstract describes the use of industry-oriented teaching and learning as part of NALI's approach to instil student-centred and blended learning philosophy among first year electrical engineering undergraduate students towards achieving entrepreneurial academia. This is conducted through learning from an industrial perspective, where traditional subject-specific teaching has been transformed to teaching in the context of application of knowledge to product design, development and operation. This bridges crucial gap between students' academic learning experience and practical industrial requirements.

Key words: Industry-oriented; teaching and learning; electrical engineering; academic; practical

Introduction

Education is fundamental to nation building and unity, where a nation's success depends very much on the knowledge, skills and competencies of its people. For this, Malaysia has undergone a rigorous education transformation plan through the launch of Malaysia Education Blueprint (Ministry of Education Malaysia, 2013) since 2013, in an attempt to adequately prepare young Malaysians for the challenges of the 21st century. In line with Malaysia Education Blueprint, the Holistic Student Development Framework (Azli, 2019) has been developed by Universiti Teknologi Malaysia, which includes the introduction of the New Academia Learning Innovation (NALI) (2020) framework. As part of NALI's approach, industry-oriented teaching and learning has been incorporated among first year electrical engineering undergraduate students of Universiti Teknologi Malaysia through the subject "Introduction to Electrical Engineering". It is an approach to learning from an industrial perspective, where traditional subject-specific teaching philosophy has been transformed to teaching in the context of application of knowledge to product design, development and operation (Gharehbaghi, 2015; Tapper, 2001; Qi, 2008). This bridges crucial gap between students' academic learning experience and practical industrial requirements.

Content

Through industry-oriented teaching and learning, students undertaking the subject "Introduction to Electrical Engineering" have the opportunity to participate in industry-related learning activities through industrial visits. The students have the chance to experience in person the nature of electrical engineering industries so that they are aware of the latest technology used in the industries. They can also better relate their academic learning experience with industrial needs.

Recognising that students nowadays are engaged in a dynamic and fast-paced teaching and learning environment, the novelty of industry-oriented teaching and learning approach is that students can, by themselves, engage in academic learning based on a rapid-changing industrial perspective. This is in line with the objectives of implementing the industry-oriented teaching and learning approach in the course "Introduction to Electrical Engineering", where the students are expected to (i) discover skills and knowledge required in electrical engineering industries, (ii) evaluate attributes of electrical engineers in practice, and (iii) analyse the responsibilities of electrical engineers to the society. This encourage their creativity towards adapting their academic learning with industrial needs throughout their university lives, so that they are better prepared to gear their academic and technical skills towards electrical engineering industries upon graduation.

The innovativeness of industry-oriented teaching and learning is that it is an approach to learning from an industrial perspective. Traditional subject-specific teaching has been transformed to teaching in the context of application of knowledge to product design, development and operation. Through industrial visits, for example, the students can, by themselves, discover skills and knowledge required in electrical engineering industries. Through face-to-face interactions with electrical engineers during industrial visits, for instance, the students can evaluate attributes of electrical engineers in practice. Through reflective report writing of industrial visits, the students will be able to analyse the responsibilities of electrical engineers to the society. These bridge crucial gap between students' academic learning experience and practical industrial requirements, and equip the students holistically to enable them to succeed with all the opportunities and challenges of electrical engineering industries of the 21st century.

The methodology for the implementation of industry-oriented teaching and learning in the subject "Introduction to Electrical Engineering" is as follows. First, the students are required to explore the background of the industries that they are going to visit. In the current era of internet of things, this is not difficult as lots of information pertaining to an electrical engineering industry can be obtained well before the industrial visit. During the industrial visit, a briefing will normally be held between the students and the industry representatives, where more detailed information about the industry can be obtained. A questions-and-answers session is commonly motivating for the students, where the students can have face-to-face interactions with engineers. Apart from getting technical information from the industry representatives, this session will also indirectly allow the students to evaluate attributes of engineers in practice. The most fascinating part of an industrial visit is the guided tour of the industry, where the students can experience the practical aspect of an engineering industry and life as an electrical engineer. In addition, the students will also be exposed to the latest technology involved in industrial processes during the tour. This will often open up their mind on the importance of their academic learning experience to be suited to industrial needs. After the industrial visit, the students will prepare a reflective report, where the students will evaluate skills and knowledge required in electrical engineering industries and analyse the responsibilities of electrical engineers to the society.

Figure 1 shows various industries visited by students undertaking the subject "Introduction to Electrical Engineering" during semester 1 of academic session 2019/2020. During their industrial visit to V.S. Electronics Sdn. Bhd., each of the students, equipped with an electrostatic discharge smock, shoes covers and a head cap, had the chance to tour around the factory to understand various electrical and electronic assembly processes involving surface-mount technology used for assembling printed circuit boards. For their industrial visit to DF Automation and Robotics Sdn. Bhd., the students had a better understanding of the requirements of automated guided vehicles in line with Industrial Revolution 4.0. They were also exposed to latest technologies in automated guided vehicles and robotic designs. Meanwhile, the students' industrial visit to Panasonic System Networks Malaysia Sdn. Bhd. increased their understand on how an electronic manufacturing factory operates, where they were brought to the research and development department and the manufacturing department of the company. At Forest City Country Garden Pacific View, the students have the opportunity to experience the latest technology used in building design and image processing for security purposes and understand the development process of Forest City through Industrial Revolution 4.0 technology. On the other hand, the visit to Smiths Detection Malaysia Sdn. Bhd. was fruitful for the students where they had the chance to tour around the factory to understand various electrical and electronic assembly processes involving X-ray machines. Upon visiting Zarafood Stuff Industries Sdn. Bhd., they students were exposed to various food (e.g. soy sauces, tomato sauces, chilli sauces and coconut jams) production processes, which included fermentation, blending, sterilization, packaging and storage. All these industry visits were well received by the students and were only possible with valuable collaborations from industries.

Figure 1: Industrial visit to (a) V. S. Electronics Sdn. Bhd., (b) DF Automation and Robotics Sdn. Bhd., (c) Panasonic System Networks Malaysia Sdn. Bhd., (d) Forest City Country Garden Pacific View, (e) Smiths Detection Malaysia Sdn. Bhd., (f) Zarafood Stuff Industries Sdn. Bhd. from October to December 2019.

The implementation of industry-oriented teaching and learning through the subject "Introduction to Electrical Engineering" has manifold impacts especially on the students. The students can have a discovery of industrial requirements at the early stage of their undergraduate studies. This allows them to tailor their academic learning experience in the campus according to industrial needs. Besides that, the students can evaluate the need to develop their skills and knowledge in line with industrial needs. The students can also have an analysis of the significance of electrical engineering from a practical point of view. This motivates their academic learning as electrical engineers in the university. Table 1 summarises some of the testimonials received from the students after participating in industry-oriented teaching and learning. Based on the testimonials, the implementation of industry-oriented teaching and learning has been fruitful for the students especially in bridging crucial gap between students' academic learning experience and practical industrial requirements.

Table 1: Testimonials from students

Students	Testimonials
Hidayah	"I would like to thank the lecturer for providing me the experience to feel like an engineer."
Chai	"I'm grateful that I manage to process the information observed in real time and analyse the process using theories and knowledge I've learnt in class."
Nahvin	"I get to know the ways to become a successful engineer and what it takes to be an engineer."
Henrietta	"There are many new things that I've learnt through this course."
Zulfikaar	"This course really shows me how an engineer works."
Ooi	"This course not only can introduce the tasks and ethics to be an engineer to me, but also can increase my knowledge about the latest technology trend in the world."
Nuqman	"This course is very interesting and it provides me a lot of knowledge about electrical engineers."
Nabilah	"We, the students, are exposed to attributes of electrical engineers from both academic and practical points of view."
Kho	"Through this course, I've learnt that we can take a few different paths to become a successful engineer."
Fatehah	"This course makes me think out of the box."
Zulfikaar	"This course really shows me how an engineer works."

Conclusion

With the emergence of internet of things, traditional teaching and learning methods is deemed no longer relevant in today's education context. Rather, the use of NALI in line with the development of the 21st century curriculum has been emphasised within the context of academic transformation to ensure that the teaching and learning methods are in line with Industrial Revolution 4.0. For this, industry-oriented teaching and learning can be the way forward in engaging and empowering learning through technology among future ready educators with the aim of instilling student-centred and blended learning philosophy towards achieving entrepreneurial academia.

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Student Exploring International Collaboration Program on Experiential Learning Approach

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Highlights: SBEL 4762 International Collaboration Program able to support student-centred learning. This course aligned with 21st-century education to increase students' soft skills, team working, leadership, communication skill, adaptability and interpersonal skill. The mutual collaboration between two universities created for enhancement and empowerment of landscape architecture and urban design curriculum via experiential learning progression. The teaching and learning methodologies of the collaborative workshop are compilations of problem-solving, exchange idea, design exercise, field visit and cultural exchanges. Practically, the impact of international mobility could prepare students successfully for New Academia learning innovation (NALI) to promote innovative learning and move toward life-long learning.

Key words: experiential learning, International collaboration program, landscape design, urban studies

Introduction

International mobility program has gained popularity in increasing student-centred learning. The international collaboration program learning process is aligned with 21st-century education to increase soft student skills in terms of team working, leadership, communication skills, adaptability and interpersonal. Thus, the Landscape Architecture Program at the Faculty of Built Environment and Surveying (FBES), Universiti Teknologi Malaysia (UTM) has widely adopted experiential learning for their undergraduate students. Experiential learning is defined as a pedagogical technique using hands-on and application for students to increase their high impact on cooperative learning and global learning (Austin and Rust, 2015). Clearly, the international collaboration program is useful for students to obtain new experiences in their learning environment beyond their local culture and landscape design studio.

The first student inbound and outbound mobility program was initiated in 2018 under the course of SBEL 4762 International Collaboration Program for Landscape Architecture students. The collaboration involves two universities: UTM and Tokyo City University (TCU). UTM has signed a memorandum of understanding (MoU) with TCU in 12th January 2016. The recent workshops were conducted in 2019 involving two international workshops in UTM and TCU, respectively for joint education and research collaboration. In UTM, Dr. Lee Yoke Lai is the course coordinator for the program. The first four-day workshop was organised in UTM with a theme: "Landscape Design for Heritage City in South-East Asia: Exploring Natural and Heritage Landscape". The workshop aims to provide a platform for students from Japan to gain a variety of cultural experiences in Malaysia. A total of 10 TCU students, Dean Professor Kazuhide Kawaguchi and coordinator Associate Professor Kei Saito from Faculty of Urban Life Studies were invited for the workshop. In order to support the program, 16 students from UTM were involved in handling the workshop as UTM organiser.

In order to ensure the running of the workshop, UTM students involved in interactive learning such as planning, preparing and problem-solving. The process of workshop planning took three months through meetings, discussions, brainstorming, proposal presentation, program revision, rehearsal, and running groundwork. The execution of this international workshop included committees for fund seeking through sponsorship; transport and accommodation; public welfare and safety of participants; banner, souvenir, T-shirts and brochure; and gimmick video for workshop's opening ceremony. The first day of the workshop (26th August 2019) was initiated in UTM campus. The opening ceremony was welcomed by the director of the Landscape Architecture Program. The first-day sharing session was primarily focused on knowledge sharing by three lecture inputs and social interaction among workshop participants. Meanwhile, there were ice-breaking and gift exchange sessions between UTM and TCU students.

The second day of the workshop (27th August 2019) began with a field study visit to the UNESCO World Heritage historic city of Georgetown, Penang. The first stop was historical landmark Fort Cornwallis and speakers were invited for the briefing including the heritage conservation expert, Ms. Hui Li Yeoh, the historical monument and landscape

restoration of a derelict Fort Cornwallis, Ms. Gisele Taxil and Mr. Giovanni Santo. Next, all workshop participants discovered Georgetown heritage workshop trail guided by an expert from the Heritage Conservation Department in the City Council of Penang Island, Mdm. Fazreen Dharleila Binti Abdul Jalil. The discovery of interactive heritage trail was completed by stories, reminiscent heritage sites, local street food and varieties of cultural heritages. The second-day workshop was ended at The Habitat where the students were guided by an expert about flora and fauna of Penang Hill. The experiential learning using heritage exposure enabled students to explore the richness of the tangible and intangible heritages in Georgetown as well as to learn about the importance of natural heritage and tropical rainforest biodiversity of Penang Hill.

The third day workshop was conducted on 28th August 2019. The participants were invited to visit a distinguished landscape architecture company in Northern Region of Malaysia, the Landart Design Company. The Landscape Architects had inspired participants peat swamp projects, stormwater and linear park design. Besides, the day was continued with a visit to an 80 years old industrial heritage Charcoal producer at Kuala Sepetang, Perak. The exploration of traditional charcoal industry operation and sustainable mangrove management allowed students to appreciate the manifestation of the natural landscape. The last day of the workshop was conducted in Singapore where participants visited Surbana Jurong Private Limited, an Asia based Consultancy for urbanisation and infrastructure developments in Singapore. Mr. Oliver Ng Boon Lee, the Head of Landscape Planning and Landscape Architecture, shared his international landscape designed projects and award-winning landscape projects. The sharing session demonstrated the complexity and implications of managing landscape projects. At the end of the workshop, UTM-TCU students presented appreciation speeches followed by gifts exchanging. This joint workshop in Malaysia had created interactive and real-life learning experiences to both students from UTM and Japan.

In response to the UTM collaborative program, TCU invited students of Landscape Architecture, Faculty of Architecture and Surveying, UTM from 3rd to 7th October 2019 to participate in their workshop in Tokyo: "Collaborative Research Project on a New Hybrid Environmental Design Technique for Historical Tourist Town in Asian Countries". A total of 10 students were funded by Japan Science and Technology Agency (JST) under the "Sakura Science Exchange Program". This is the second time where UTM participants were invited to collaborate with TCU Urban life Studies Faculty right after the first collaboration was carried out successfully in 2018. The first-day workshop started in TCU Todoroki campus with an opening ceremony initiated by Prof. Dr. Kazuhide Kawaguchi, the Dean of TCU. Next, students were involved in reintroducing themselves amongst each other. All participants were invited to join the Todoroki annual campus festival as well as TCU Library. The program continued with a study walk by the river landscape, namely Todoroki Valley, which was filled with serenity and calming atmosphere, as well as information was given by TCU lecturers.

The following day, 4th November 2019 began with three lectures sessions on Historical Landscape Conservation and Urban Environmental Design. Also, three UTM students were given an opportunity to present their studio project and landscape competition. After the sessions, all workshop participants headed to Kawagoe City, a well-known Denken Area which is famous for its traditional Japanese urban setting. Through the lectures and field visit, UTM students had a great experience to appreciate well-conserved historic architecture buildings, streetscapes design and cultural activities. In 5th November, the workshop continued with a field visit to Kamakura town (Samurai town), a famous heritage tourist. Participants visited Kamakura City Hall for a sharing session about City Planning in Kamakura; Ancient Capitals Preservation Act that established in 1966 and Urban Design guidelines of Kamakura City. Participants conducted a field survey at Kamakura city and site observation for this workshop. In 6th November 2019, an off-campus lecture session at Mitsubishi Estate Co. Pte. Ltd. located in Chiyoda City, Otemachi. The talk session was related to Mitsubishi's Urban Design development and Heat Island Mitigation measurement at Dai-Maru-Yu. Participants visited several popular places such as Tokyo Station, Marunouchi Park Building, Nakadori Avenue and Marunouchi Park Building before returned to Yume campus for a brainstorming session and synthesis design for Kamakura Heritage City.

In the last day of the workshop, 7th November 2019, each group were required to prepare a final presentation by developing innovative conceptual ideas for Kamakura City. The presentation included site analysis, synthesis and design synthesis. Each group presented urban design outcomes to the International Council and all lecturers of TCU. After certificate awarding session by the International Council of TCU to all UTM students, participants were invited to join the farewell party prepared by TCU as a celebration of completing International collaboration 2nd joint workshop 2019 with UTM. The workshop in TCU was closed by handmade gifts as a token of remembrance to TCU students. Through this collaborative workshop between Japan and Malaysia, UTM and TCU students had gained knowledge in cross-cultural learning experiences, field visit, expert input lectures, student interaction, design process and reflection that contributed to their experiential learning.

International Collaborative Program

Before 2018, the course of SBEL 4762 International Collaboration Program practised one-way learning. The workshop knowledge sharing session was conducted in one session per year. Previously, host university in Indonesia invited UTM students to join their workshop in Indonesia, or Indonesia students visited Malaysia in a different year. However, the collaboration between UTM and TCU is two-way experiential learning through workshops conducted in three different countries in the same year. In Malaysia, the workshop involved experts sharing and site visits in Malaysia and Singapore as well as report writing and synthesis design. UTM students were invited to join Sakura Science Program hosted by TCU in the same year. UTM and TCU had facilitated a first two-way workshop to provide undergraduate students experiential learning through cross-culture learning and cooperative learning for greater accountability. Malaysian

and Japanese students were able to exchange ideas and expand their thoughts on nature and cultural heritage. The narrative process of learning experiences had increased the effectiveness of experiential learning compared to the traditional teaching method. In a nutshell, teaching and learning through international collaborative workshop had added value for both professions and students in the field of landscape architecture and urban life studies curriculums.

Therefore, the objective of the international collaboration program is to provide experiential learning for undergraduate students via outbound mobility programme. Experiential learning through workshops and visits could ensure real learning experiences in built environment education. The planning and implementation of the workshop program should revolve around a global issue related to natural and cultural heritage. UTM and TCU students gained the knowledge of learning landscape design and urban studies through real field visits, sharing and synthesis design associated with current real urban issues at historic cities. Students were guided to identify the critical issue, analyses, applied design idea and writing reflection and report. Likewise, the learning activities embedded in the international collaborative workshop comprised expert lectures, field trips, site appraisal, brainstorming, design process, and review. The collaborative workshop is an opportunity for both partner universities to exchange academic and research knowledge in landscape and urban design. Significantly, the series of lectures delivered by industry experts such as landscape architect, urban planner, heritage expert, archaeologist and NGOs were able to benefit students and academicians from both universities. The empowerment in teaching and learning through international workshop could enhance the learning process of different parties such as students, lecturers and industrial practitioners.

The innovativeness of the course includes a two-way knowledge exchange between two universities in a year. The entire workshop is designed to cover all required syllabus and maximise the learning in a short time of period. The industrial experts sharing and scholars' involvement in a series of lectures had covered the important curriculums of cultural and natural landscape heritage conservation, urban landscape design and site planning courses. The teaching and learning methodologies of the collaborative workshop are compilations of problem-solving, exchange idea, design exercise, field visit and cultural exchanges. The invited speakers and experts from the industry explored the students with the current practices of urban design and heritage conservation—for example, the Japanese speaker from Mitsubishi Estate Co.Pte. Ltd shared urban planning strategy and technology used in urban design and heat island. Also, a field visit was used as case studies for students to observe and develop innovative conceptual ideas for a particular urban heritage city. Overall, all of the above could not be achieved using a traditional way of teaching and learning.

International collaboration workshop was found as one of the platforms of cooperation network activities between UTM and TCU to achieve academic development and joint research. This collaborative workshop meets the requirements of UTM Graduate Attributes, the 21st Century curriculum. UTM students are expected to master soft skills such as communication skills, social skills and leadership. The application of New Academic Learning Innovation (NALI) was practised through conducting workshop and involvement in the workshop, particularly for international level. Students learning abilities can increase when they involved in organising workshop, engagement and learning through global issues, peers learning, and partnership with global communities. In short, the international mobility program was able to support and improve the current quality of student-centred learning to achieve the New Academia Learning Innovation (NALI) and National Higher Education Strategic Plan (PSPTN) for enhancement and empowerment of education via experiential learning progression.

Conclusion

Student international mobility program is to develop the mutual collaborative student learning and experiential learning through a collaborative workshop. It is essential and beneficial for students inbound and outbound mobility to explore intercultural learning experiences and develop global citizens for both universities in different backgrounds and environments. The international collaborative program had created an opportunity for students to advance their learning and blended learning to improve their learning experiences. Through student outbound mobility program, the experiential learning process had exposed students on planning, managing and conducting a collaborative international workshop to achieve the learning outcomes of proactive participation, engaged learning, innovative ideas and students' internationalisation curriculum. Moreover, the organised collaborative workshop has created a platform for all students in developing heritage landscape knowledge, urban design and cultural exchange. Students had gained more learnings in terms of real-life issue, visualities and experiences learning connected to the unique heritage, landscape and urban design studies in Malaysia and Japan. On the other hand, the development of students personalised learning could improve their confidence and enhance their leadership qualities. In short, student centred-learning through international collaboration program could enhance students' learning empowerment in mobility experience, cultural exchange, knowledge expansion and social skill. This learning process will help students to promote innovative learning and move toward life-long learning independently to solve problems. The alignment between teaching and learning of different universities could prepare students successfully for New Academia learning innovation (NALI) via experiential learning-based workshop and outbound mobility program.

Acknowledgement

We are grateful for Landscape Architecture Program, workshop sponsorships, Tokyo City University (TCU)and Sakura Science Program.

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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. About 41 students were invited to pick three research articles that they find important and interesting from reputable journals and then to share a very brief 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 assingments. 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.

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

Introduction

#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 brief 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.

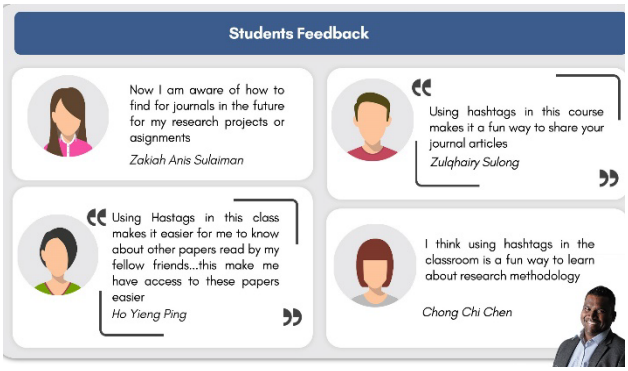

Figure 1: Feedbacks from the students

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 INNOVATION COMPETITION (PIP 2019)	Using #Hashtags in Facebook to Facilitate Teaching & Learning of Research Methods	UUM	2019
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

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Visual Planning Tool For Postgraduate Students Towards Graduate On Time (GOT)

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Highlights: Majority of the postgraduate students have difficulties to visualise the whole research process which they need to engage to complete their studies. Nevertheless, the postgraduate students might have their research proposal as reference, however there was nothing available that brought the information into a coherent, easy to manage whole where they can visualise in one image. By using visual tools postgraduate students also can visualise each of the study involves in terms of method to be used, sample size, tools to conduct the study and even the number of papers with title that could be generated from each study from their research project. Will be easier for supervisors to monitor their students' progress based on this kind of flowchart. This is important, because the students would not be able to lose track of their research project. This type of visual tool can be used as research planning tool for the postgraduate supervision towards Graduate on Time (GOT). This visual tool or the flowchart was copyrighted in 4th March 2019 (LY2019000696).

Key words: Research Planning; Swimlane flowchart; Graduate Schools; Graduate on time; Visual tools.

Introduction

Generally, many postgraduate students failed to conceptualise their research topic visually. Majority of the postgraduate students have difficulties to visualise their whole research process which they need to engage in order to complete their studies. Nevertheless, the postgraduate students might have their research proposal as reference, however there was nothing available that brought the information into a coherent, easy to manage as a whole where they can visualise in one image. The lack of structure and the level of independence required has led to students reporting feelings of disorientation and isolation (Hoffman & Julie, 2012; Shaw, Holbrook, & Bourke, 2013; Tobbell, O'Donnell, & Zammit, 2010). As a result, visual tools such as this flowchart could be used by the postgraduate students as a strategic research and writing tool for them towards Graduate on Time (GOT). Among the objectives of this innovation is i) to develop a visual tool for postgraduates on their research journey and ii) to support the process towards GOT.

By using a visual planning tool like this swimlane flowchart, postgraduate students could visualise each of the study involves in their project in terms of method to be used, sample size, tools to conduct the study and even the number of papers with title that could be generated from each study from their research project (Figure 1). These details are important, because the students would not be able to lose track of their research project. This visual tool will also enhance the students' understanding and interest of their research overall. In short, the flowchart will give a summary of the postgraduates' research journey in a flowchart. Students at this level are expected to take personal responsibility for their learning and to change their practice and shift their expectations such that knowledge will no longer be gained through 'transmitted messages' but through 'social processes' (Tobbell, O'Donnell, & Zammit, 2010).

This type of visual planning tool can be used by almost all postgraduate students. It is a visual research planning tool which could be adapted for any field of studies. It gives a clearer picture of the journey of their postgraduate project. It would be better if the postgraduate students could come out with their own visual planning tool at the beginning of their study to make sure each student are on track of their research. This is important because attrition can be as high as 50% for students on postgraduate research programmes (Shaw, Holbrook, & Bourke, 2013) and aside from the capacity to adapt to different expectations, an altered skill set and the ability to manage external life influences (e.g. family, work demands – acknowledging that many postgraduate research (PGR) students will be working part-time to provide financial sustenance for their studies) are oft cited factors influencing dropout at this level (Hoffman & Julie, 2012; West, 2012). Therefore, time management could be considered fundamental to success at postgraduate level.

Visual tools like this could also be utilized for supervisory meetings and as monitoring tools by the supervisors. Understanding the research process, and prior involvement in scholarly activities eg. presenting, producing publications/research papers are also significant factors in relation to academic readiness for PGR programmes (Hoffman & Julie, 2012). With this the author hope, by using the visual planning research tool, the postgraduate students would be able to complete their studies on time.

The author has presented this innovation in several notable events such as K-INOVASI 2019, MALAYSIAN TECHNOLOGY EXPO 2019, PIP 2019, INDES 2019, PiCTL 2019, SPeDIP 2020, BIF 2020 and during the launching of Putra Future Classroom

by the former honorable Minister of Education YB Dr. Maszlee Malik in UPM. The author also has won several medals for this innovation (Table 1). The author has successfully filed a copyright for this work particularly the flowchart (LY2019000696) in 4 Mac 2019.

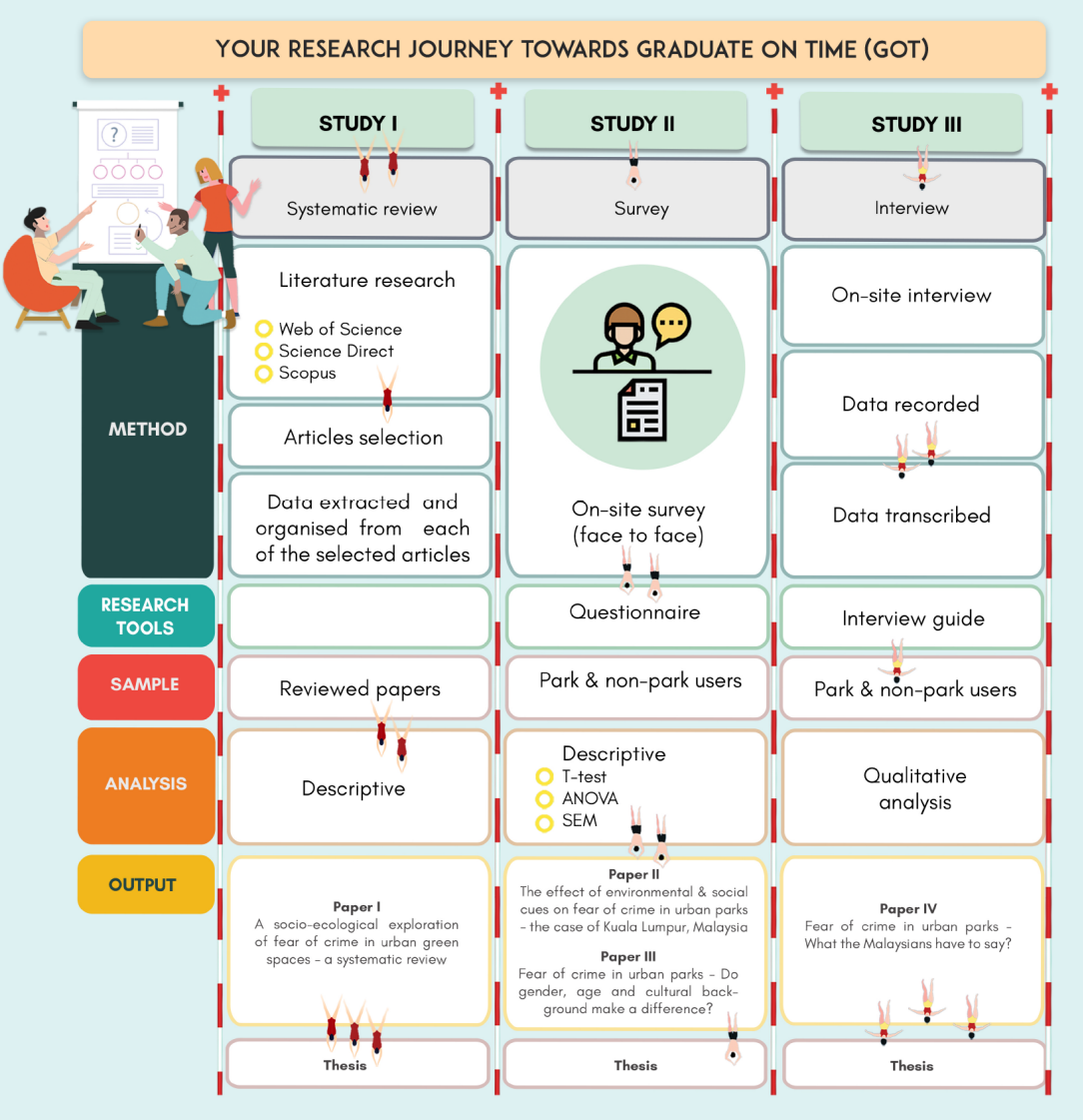

Figure 1: Visual Planning Tool Towards Graduate on Time (GOT

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)	Visual Planning Research Tool for Postgraduate Students Towards Graduate on Time (GOT)	INSTITUT PENDIDIKAN GURU KAMPUS SARAWAK	2020
BRONZE AWARD	INTERNATIONAL INVENTION INNOVATION & DESIGN COMPETITION 2020 (3iDC)	Visual Planning Research Tool for Postgraduate Students Towards Graduate on Time (GOT)	UiTM Kedah	2020

GOLD AWARD	PUTRA INNOCREATIVE CARNIVAL IN TEACHING & LEARNING (PicTL2019)	Visual Planning Research Tool for Postgraduate Students Towards Graduate on Time (GOT)	UPM	2019
SILVER AWARD	INTERNATIONAL LEARNING INNOVATION COMPETITION (PIP 2019)	Visual Research Planning Tool for GOT	UUM	2019
SILVER AWARD	8TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION (iNDES 2019)	Visual Planning Tool Towards GOT	UiTM Perak	2019
GOLD AWARD	INTERNATIONAL EUREKA INNOVATION EXHIBITION 2019 (i-EIE2019)	Visual Research Planning Tool for Postgraduate Students Towards Graduate on Time (GOT)	UniKL MSI	2019
BRONZE AWARD	I-InTeL2019 (INTERNATIONAL INNOVATION IN TEACHING & LEARNING 2019)	Visual Tool Kit for GOT	UiTM Kedah	2019
SILVER AWARD	INTERNATIONAL LEARNING INNOVATION COMPETITION (PIP 2019)	Visual Research Planning Tool for GOT	UUM	2019
MERIT AWARD	MALAYSIA TECHNOLOGY EXPO 2019 (MTE 2019)	Using Swimlane Flowchart as Planning Tool for Postgraduate Students Towards Graduate on Time (GOT)	MARS	2019

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Adopting Profiling Assessment on Measuring Students' Competency on Training Needs Analysis

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Highlights: The objective of this profiling assessment is to measure students' level of understanding on the skills and knowledge in Training Needs Analysis (TNA). Students are guided in the TNA through hands-on field work on task analysis. The course lecturer acts as a facilitator to guide students step by step in performing the TNA process (in groups) beyond the classroom. This method of learning assessment enables the course lecturer to assess students' competencies and state of mind.

Key words: Profiling; TNA; task analysis

Introduction (Project or Innovation)

In the training and development field (T&D), skills or competencies in conducting TNA is critical to design effective training activities. An accurate TNA makes it possible for a trainer to identify employees' current and future needs and help design training programs that fit and satisfy employees' needs. Therefore, it is crucial that HRD students' competency in conducting TNA be equipped by *SHMR1093 Needs Assessment. Their competency in this matter must* be measured in order to uplift their training consultancy skills.

Relevant training providers in Malaysia such as Human Resource Training Fund (HRDF) and Management Institute of Human Resource Management (MIHRM) for instance, offer the TNA as a certified professional course to industries and future trainers. Pertinent training practitioners at all levels from training officers to training consultants and instructors must equip themselves with TNA competencies. This implies that students who master the TNA, have bigger potential to become HR practitioners or training consultants after they have graduated from Universiti Teknologi Malaysia.

Content (Project or Innovation)

In order to adopt a profiling assessment into SHMR1093 *Needs Assessment in HRD* course, the major competencies in TNA must first be identified. A standard competency is used as a basis to map TNA competency for this course. The National Occupational Skills Standards (NOSS) under the Department of Skills Development in Malaysia has outlined relevant competencies in TNA from related occupations for instance Training Consultant, Training Manager, Training Executive, Training Officer and Training Instructor. There are six major competencies in TNA (Table 1) from NOSS, and each of this is categorized into knowledge (K), skills (S) and abilities (A) related to SHMR1093 course when students carry out tasks in class and beyond classroom (overall).

Table 1: Competency in TNA (NOSS Standard)

Competency	Knowledge	Skills	Abilities	Task/activity in Class
Analyse assessment needs and requirements	Scope to be assessed What tool to be used	Analysing Evaluating	Resourceful Reliable ethics	Game In-class discussion (ICD) Project
Develop assessment plan	Assessment method/ process/technique Planning Validity/reliability	Identification of instrument to be used	Proactive Rationale Not prejudice Resourceful/reliable	ICD Case study Project

Prepare competency assessment instrument	Types of instrument	Interpretation Data collection	Integrity Reliable	Project Case study Class activity
Conduct knowledge assessment session	What to ask What to collect Whom to ask	Determine type of instrument Data collection	Observance Proactive Reliable Consistent	Project
Conduct performance assessment session	Factors to consider in assessing	Follow checklist Determine procedure	Proactive Accountable	Project
Perform candidates' performance measurement	Findings analysis Gap analysis	Interpretation Prepare gap report	Clarity Accountable	Project

In order to measure the outcome of students in TNA, the level of understanding on the following skills and knowledge in Task Analysis through Group Project are measured:

Table 2: Competency in TNA (SHMR1093)

Details		**Marks**		
		Above standard (5-4)	**At standard (3-2)**	**Below standard (1-0)**
Develop project planning/assessment plan	Details major process and milestones of the project. Include charts – Gantt, milestone			
Following needs assessment process	Elaborate the method, instrument used, participant characteristic/criteria, task descriptions, knowledge assessment session – what to ask, what to collect, whom to ask			
Conduct findings or gap analysis	Report the findings and interpret the gap (include chart/diagram/table)			
Recommend training and non-training intervention	Propose training/non-training intervention based on gap analysis For training, include a proposed outline of the training program following template of Annual Training Plan			

All relevant competencies to TNA are integrated into the project, to measure the final outcome of the TNA competencies. The project requires students to perform task analysis on certain jobs and students need to identify training needs and gap analysis and recommend solutions for training and non-training. The details are as follow:

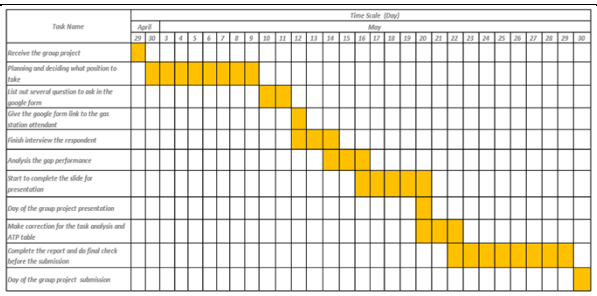
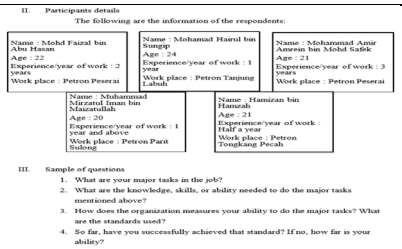
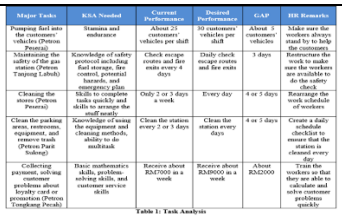
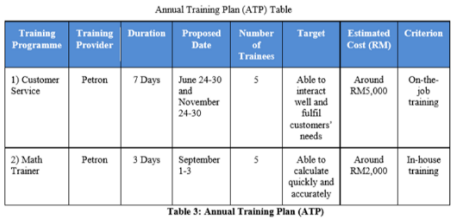
Project Instruction:

1. Choose 4-5 persons you know who are currently working and see whether it would be possible to do a TNA on a particular job classification or on his or her job (conduct interview sessions or whenever possible through online interview or *Whatsapp*).
2. Analyze their duties and tasks. From these tasks list the KSAs that they need.
3. Identify the deficiency/gap in any of these KSAs
4. Identify and list the training/workshop offered to these people to help them be successful
5. Are these relevant to the KSAs you identified?
6. What additional programs would you recommend be offered?

Sample of findings:

The sample shown in Table 3 is the group that carried out task analysis to petrol station staff (support staff). The chosen participant is based on information accessibility factor particularly during Covid-19 scenario as this project has been executed during the period. The sample answer showed that in overall, these students have good competency in carry out the TNA process. Only the skills and knowledge to recommend appropriate intervention to training and non-training need to be improved as the suggested intervention is less relevant to the gap analysis for the group. Students need to be more critical in interpreting the analysis results so that the recommendation can be more practical to address the identified gap.

Table 3: Group A Profiling on TNA Competencies

Competency	Outcome	Level
Develop project planning/assessment plan		Above standard (5)
Following needs assessment process		Above standard (5)
Conduct findings or gap analysis		Above standard (4)
Recommend training and non-training intervention		At standard (2) The recommendation is not relevant to gap analysis. Evidence is not supported

Acknowledgement

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The Application of Quality Cycle in Teaching and Learning Process

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Highlights: Understanding customer's satisfaction is one of the main principles and requirements of quality management system. Quality cycle is an improvement process tool for total quality management to solve any problem or poor quality services. This tool was explained in total quality management course and was put in application for this study. At the end of the course, the students were instructed to find a solution for poor quality services provide by intended organization based on their perspective. The results of study showed that all of the students were able to solve the problem systematically and effectively as service provider.

Key words: Education; Improvement Tool; Quality Cycle; Student; Teaching

Introduction

Quality cycle have been used for many years as improvement tool in total quality management to find most wanted solution for any sort of poor delivery services. It is applicable for any process to ensure the most wanted quality results are achieved and have maximum customer satisfaction. The four main stages of quality cycle are, plan, do, check, and act require for any improvement process including teaching and learning process in education sector (Tomoko and Masahiro, 2016; Rita, 2014). The most effective way for students to understand any introduced methods to solve any problem regarding quality services by creating a real case or situation regarding that problem and later ask them to find alternative solutions to solve the rising issues in that particular problem. This learning approach represent one of creative methods to change student's perspective and their role as service provider. The objective of the study to introduce the quality cycle as improvement tool and change the role of customer as service provider to suggest solutions for poor quality services provide by an organization based on their point of view.

Methodology

There is a possibility to apply a quality cycle in solving poor quality services by changing student's perspective as customer to be service provider through creative learning process as illustrated in Figure 1.

Figure 1: An example of using quality circle to solve poor quality services.

This study requires from group of students in same academic programme to list and describe at least five poor qualities services provide by their university. The poor quality services address by students represents the first principle of quality management that concern customer focus in Malaysian standard ISO 9000:2015. It would be required from students to find the right way or medium for submission of their complaint or feedback. Then, they were required to choose and apply the right tool of analysis to present practically their feedback. In the last activity, they were instructed to write their own way of solving the problem so that better solutions would be presented based on customer perspective to deal with poor quality services provide by an organization.

Finding and Discussion

Minimizing defects in any product including educational services is the main target of any organization to satisfy their customers (Azizah et al., 2011, Ewa et al., 2019). This study was conducted to identify poor quality services provide by any organization and find solutions for it using quality cycle as described in Table 1. The study showed there were many unsatisfied services listed in the student's feedback that need to be categorized in different group. As a real customer, they should not allow seeing their feedback but the student were being asked to rearrange the feedback based on general facilities, class rooms, tuition fee, administration staffs, food, and many more. Communicating the feedback with the customer can also be done in many ways such as notice board, website, blog, and other medium. Each group of poor quality services should be presented as a bar graph for analysis and done by the students for learning purposes. Usually the feedback analysis is done by product provider to find a solution for each defect in the product. In this study, the student as a customer need to suggest any solution for the poor quality services based on their perspective and opinion (Dimitris et al., 2018). In conclusion, the student showed ability to solve a given problem using quality cycle tool and have better understanding and learning process when they have been asked to be involved in a real case regarding poor quality services that face by them. Changing the customer's role as proposed in Table 1 may enhance their way of thinking and therefore a better effective communication of solutions going to be presented that sometimes need by product providers and out of their thinking.

Table 1: The proposed role play by a customer to solve poor quality services.

Quality cycle stage	Lecturer role (Service Provider)	Student role (Customer)	Customer role	
			Conventional	Proposed
Plan	Identify product for feedback	Writing feedback	Yes	Yes
Do	Collect Feedback	Rearrange feedback	No	No
Check	Apply analysis	Analyze feedback	No	Yes
Act	Solve problem (poor services)	Suggest Solutions	No	Yes

Awards Received

S/N	Award	Title of project	Exhibition	Year
1	Silver Medal	Disease Prevention and Health Promotion: Test workplace for Radon	Selangor Innovation & Creativity Exposition (SLICE '18), Shah Alam	2018
2	Bronze Medal	Practical Simple Method of Avoiding Radon Accumulation for Health Promotion	ASIA International Innovation Exhibition (AIINEx) 2020, Johor	2020

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The Significance Role of Radon Monitoring and Detection in Public Health Education

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Highlights: Radon is a harmful gas and the main cause of lung cancer for non-smoker persons. Many previous studies in Malaysia showed that some places in Malaysia with high radon level more than 100 Bq/m^3. The proposed detection method was continuous radon monitor using alpha spectrometry devices. The results of the study showed that the existence of radon in commercial and residential buildings exceed healthy level. Its weekly concentration level is more than the worldwide average indoor radon concentration of 39 Bq/m^3 that require organizing community awareness public talks to explain its possible hazard and how to avoid its exposure.

Key words: Cancer; Concentration; Detection; Hazard; Radon

Introduction

It was being reported by World Health Organization (WHO) that radon is the main cause of lung cancer for those non smoker individuals. It was found that radon is the second cause of lung cancer after smoking (Nancy & Gary, 2018). Generally, the lung cancer risk increases when increasing radon exposure. The high amount of radon concentration may require considering implementation of safety rules in order to avoid unnecessary exposure to this natural radioactive gas. The high concentration of radon in indoor air has a high considerable risk of lung cancer in the range from 3% to 14% (Hajo & Ferid, 2009). Understanding the possibility of radon causes health hazard is very important in healthcare and may create public awareness to avoid its exposure. The objective of this study is to monitor, assess, and report level of radon concentration in commercial and residential buildings and also to find the way to prevent its accumulation through the most creative and simple practiced method of radon dissipation in order to avoid or minimize its risk factor.

Methodology

Many studies were conducted to monitor the concentration of indoor radon and were found to be in the range of 0.30 pCi/l to 3075 Bq/m^3 (Nisar et al., 2017; Abdullah et al., 2018). In this study, the proposed detection method was continuous radon monitor using alpha spectrometry devices. The quality cycle approach was implemented for more systematic detection technique and process. Any monitoring and reading results of concentration level may indicate its possibility of having health risk. For example, it may include maximum & minimum readings, weekly average reading, and accumulation & dissipation readings. A well-defined planning of finding the way to avoid high exposure to radon is a beginning prevention step to keep healthy indoor air. Implementing and doing the right technique of radon monitoring is the second step to determine its concentration level. It is necessary in next step to check if there is any possibility of radon accumulation in a certain defined place. The final step requires acting against radon accumulation and finding the way to reduce it which is refer to radon dissipation.

Finding and Discussion

There is a possibility that most of the public population have less knowledge or lack of information regarding radon gas as one of the cancer-causing radioactive elements (Nancy and Gary, 2018). Radon monitoring and detection are the way to determine its concentration level as illustrated in Figure 1. The results of the study showed that the existence of radon in commercial and residential buildings more than healthy level of 100 Bq/m^3. Its maximum reading was 142 Bq/m^3 and the average concentration level during accumulation was 101 Bq/m^3.

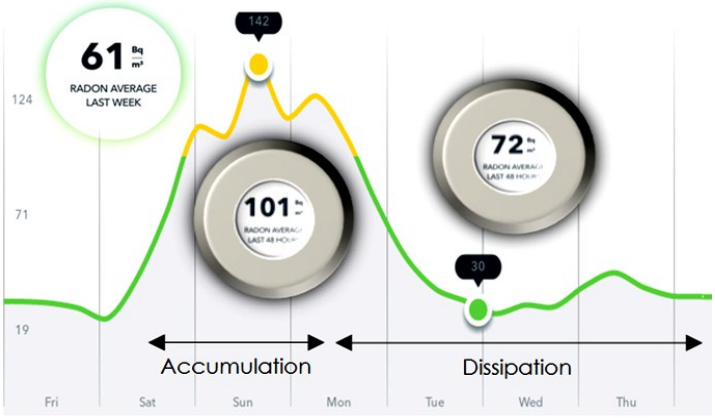

Figure 1: Weekly Radon Monitoring Graph

The weekly concentration level of 61 Bq/m3 as presented in Table 1 was more than the worldwide average indoor radon concentration of 39 Bq/m^3 that might require community awareness regarding its hazard. This result showed the significance of radon monitoring in places with high potential of accumulation to avoid its health hazard. It also suggests doing additional surveys of radon concentration due to 9.9% of workplaces have radon concentration more than action level (Nirmalla et al, 2015) to keep healthy environment for population as stated in public health policies.

Table 1: Radon concentration level in Bq/m^3 for a selected defined place.

Maximum Reading During Accumulation	Minimum Reading During Dissipation	Weekly Average (Friday-Thursday)	Monitoring period	
			Accumulation (2 days)	Dissipation (2 days)
142	30	61	101	72

Award received

S/N	Award	Title of project	Exhibition	Year
1	Silver Medal	Disease Prevention and Health Promotion: Test workplace for Radon	Selangor Innovation & Creativity Exposition (SLICE '18), Shah Alam	2018
2	Bronze Medal	Practical Simple Method of Avoiding Radon Accumulation for Health Promotion	ASIA International Innovation Exhibition (AIINEx) 2020, Johor	2020

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Effectiveness Online Learning for Digital Systems Course during COVID-19 Pandemic

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Highlights: This paper describes the implementation of online learning for Digital System course for semester 201920202 that was running during coronavirus disease 2019 (Covid-19) pandemic. The online learning is implemented using synchronous and asynchronous methods. The paper will discuss three main elements such as online learning design, online learning delivery and online learning assessment. To facilitate the elements, a few online learning tools are used. The end of this paper is the reflections or feedback from students to analyse the effectiveness of the online learning method used for this course. Most of the students were satisfied with the online learning implementation. This paper is summarized with the results of students in terms of CLO achievements.

Key words: synchronous online learning; asynchronous online learning; online learning tools

Introduction

As an alternative to face to face learning especially during coronavirus disease 2019 (Covid-19) pandemic, online learning is implemented as a delivery method to give the lecture to the students. The Covid-19 pandemic has raised significant challenges for the higher education community worldwide. A particular challenge has been an urgent and unexpected request for previously face-to-face university courses to be taught online (Rapanta et al. 2020). In general, a complete online course requires an elaborate lesson plan design, teaching materials such as audio and video contents, as well as technology support teams (Bao 2020). Online learning refers to a type of teaching and learning situation in which the student is at a distance from the instructor that uses some form of technology to access the learning materials (Anderson 2011).

This study attempted to analyse the feedback of the students about online learning for subject Digital Systems. We combined the method of synchronous and asynchronous for this class. Students have to interact in real time and off time for synchronous and asynchronous, respectively. To get the measurement of the effectiveness of online teaching, the survey has been conducted at the end of the class. We extract the feedback or comments from the survey and categorize them into satisfactory, disagree and improvement on online learning.

Methodology

In the 201920202 academic session, there were 14 sections offered for the Digital Systems course. In this study, the results based on the online learning implemented in two sections with 53 students from Electrical-Electronic Engineering programme are emphasized. Three CLOs are evaluated. CLO1 is to analyse and design complex digital systems within defined specifications. CLO2 is to identify and select appropriate references and components as design resources using Computer-aided Design (CAD) tools. CLO3 is to construct complex digital systems responsibly and ethically using CAD tools. The result of this paper is the students' feedback regarding the effectiveness of the learning process through online delivery methods. Besides, the performance of students in terms of CLO achievement is also presented and can be used as an indicator to generally evaluate the effectiveness of this new learning method.

Fig. 1 shows the framework used for this paper. The learning process started with the design planning, followed by methods used for delivery the learning and lastly the assessment. In these two elements, suitable online learning tools are chosen and used to facilitate the learning process. The output from these learning elements are students' feedback based on the delivery and student's performance based on the assessment.

1) Online learning design

In the online learning design, the learning process applied student-centered learning where students need to actively participate in the learning activities. These activities are organized well with some duration to fit for the 2 hours class time. The activities such as students must read slides one-hour prior the class started and live interaction with students during class i.e the Q&A session is estimated around fifth teen minutes. The discussion can be done using online tools i.e e-learning, Padlet and Telegram either for the lecturer giving the questions or students write their findings or answers and eventually to be discussed at the end of the class. In this phase, the condition of students is examined since they are not in the same place i.e the Internet at students' places. If some of the students have problems with Internet

access, the class needs to be organized in an alternative way i.e instead of real-time, the video of the class can be recorded and uploaded to Youtube.

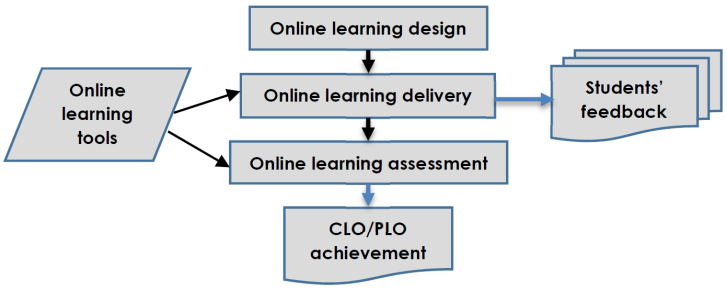

Figure 1: Framework

2) Online learning delivery

During the COVID-19 pandemic period, two methods for online learning delivery are implemented as shown in Table 1. Asynchronous online learning means online learning does not occur real-time, where no live session and no communication with students interactively (one-way communication) and can have a pre-recorded video to support the learning. Synchronous online learning means online learning occurs real-time, by carrying out live learning sessions with the students and able to communicate interactively with the students (two-way communication). Among these methods, asynchronous online learning has mostly been implemented since it allows students to learn at their own pace and time.

Table 1: Methods used

Asynchronous Online Learning	***Synchronous Online Learning***
We start by recording video of the lecture notes online tools i.e Zoom, Webex, Google Meet, Power Point, OBS studio etc. The lecture video is uploaded into Youtube and its link is copied to be uploaded in UTM e learning one hour before class begins. Students will watch the video during class time for 2 hours. At the same time, the question session is opened using telegram synchronously during the class time. For certain topics, once the class is completed, homeworks are given for students through UTM elearning and students are asked to share their answers in Padlet. For the class attendance, activity completion that has been provided in UTM e learning is used. Students that opened any document including videos in their elearning account will be marked which indicates that students have joined any class activities that have been done. At the end of semester, students will give their feedback for this learning method by filling a provided google form. Their responses will indicate the effectiveness of these learning activities.	We used online tools i.e Webex and Google Meet. The students have to attend the class at a specific time for 2 hours. They can give the questions if they don't understand at that time through Whatsapp, Telegram or chat and the lecturer will answer accordingly at that time. Besides, real time assessment with students is conducted using UTM e-Learning.

3) Online learning assessment

Online assessment can be used to assess learning for either formative (alternative) or summative (traditional) assessment. Traditional online assessment involves paper-based evaluation including online final examination and online tests whereas alternative online assessments include real-world application and higher order level of thinking. Both the online assessments can be implemented based on either real-time online interaction (online synchronous assessments) or one that does not involve live sessions (online asynchronous assessments). For this subject, tradisional online synchronous assessments are implemented. Methods such as final examination and test are used and implemented using UTM elearning, whereas for alternative online assessments, online asynchronous assessment is applied that is project based learning using tools i.e uploading video of project to Youtube and submitting report into assignment UTM elearning.

Results and Analysis

For the result, students give their feedback on accomplishment of online learning that has been done for the subject. The pie chart in Figure 2 shows responses from students regarding the online learning method that have been used to conduct the class. We summarized the feedback and comments given by 201920202 students

towards the online learning for digital system course. As displayed in Figure 2, it shows that about 88% of the responses are happy with the conducted online learning. Most students agree with asynchronous online learning since they argue that recorded video can avoid the poor Internet situation that they may face during class and they also can replay back the video anytime to watch and revise everything which may be missed out.

Along with these findings, 75% of the students give their satisfactory comment as shown in Table 2. Some satisfied comments said that the current way of online learning is the most efficient since it helps students better at self-learning. The asynchronous learning helps students to re-learn or re-watch every time the student got lost or forgotten. They argue that the rest depends on the student's effort. However, around 25% of students disagree with online learning as shown in Table 3 and some of them propose improvements as shown in Table 4. They argue that online learning is not effective because of internet connection and it is hard for them to ask questions directly. They argue that 70% of the understanding is when they can interact with the lecturer during the class and they prefer to have face to face class back.

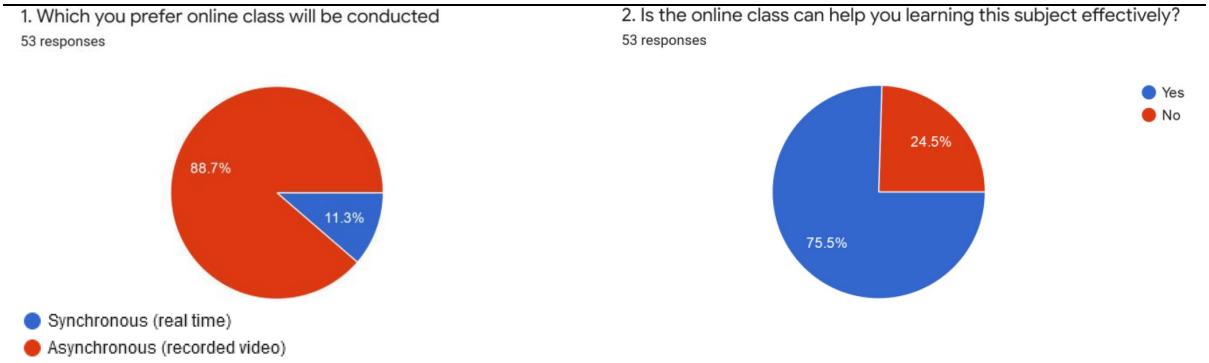

Figure 2: Students' responses

Table 2. Student's feedback that satisfy for the conducted online learning

R	Sample
1.	Asynchronous class will be suitable for those who have poor internet connection in home, so far the lectures are conducted nicely
2.	Asynchronous class is good and suitable for me because I can listen to the recorded video repeatedly, so that I can have a better understanding on the related topics.
3.	Very good
4.	Make more interesting recorded video because we will see it always
5.	Asynchronous online class is much better than synchronous class, but not really better than face-to-face class when it comes to hands on section, this is obvious to be seen when conducting milestone projects. However, the overall online classes conducted were fine and effective.
6.	The homework is the best thing for me to keep in track. Even though, i really lazy to do it after class. But it really helps.
7.	Recorded video help student to understand more
8.	Either synchronous or not the teaching session should be recorded because sometimes the sound quality of the live session is bad
9.	I love online classes
10.	Online videos can help a lot due to it being recorded and allowed to be replayed back to the video to watch and revise everything which may be missed out. Face to face teaching might lose a lot of knowledge if students cannot catch up.
11.	Record every synchronous session and share it for those students that does not have stable internet connection at the time of class and it could also be a reference for every students to revise the topic
12.	I think online class by recorded video is very easy to understand because we can replay it.
13.	I like the idea of asynchronous class because we can repeat the video again and good also for students that don't have the best internet line at their place for joining the meet. so those student still can learn the topic at different time when they have the best internet connection
14.	It is good to make sure everyone watches the video every week. I prefer asynchronous because I can watch and understand the video at my own pace.
15.	No need for improvement
16.	I think the current way of online teaching is the most efficient since it helps students better at self-learning.

	The asynchronous learning helps students to re-learn or re-watch every time the student got lost or forgotten. So yeah, in my opinion this is the best way for online learning. The rest depends on student effort to do or not.
17.	Students can understand well via uploaded videos since it functions similarly to one-to-one T&L, also it can be repeated for clearer understanding/revision. Also, thank you Dr Ismahani for the clear and comprehensible lecture videos in the past sem.
18.	I like asynchronous because it can be viewed many times. The content is good enough too with those explanations and examples

*R-Respondent

Table 3: Students' feedback that disagree for the online learning

R	Sample
1	Online class is not effective because of internet connection and it is hard to ask question
2	Offline class is always better than online class
3	Hopefully face to face class back
4	I prefer normal class I think the online teaching either synchronizing or asynchronous is not good enough 70% of the understanding is when you interact with your lecturer during the class. So if I want to say my opinion , they shouldn't be online classes anymore and go back to the traditional method And my rate for the online classes last sem is 1 out of 10

Table 4: Student's opinion to improve online learning

R	Sample
1	Make it simple and understandable
2	Use pen instead of mouse to do example on presentation
3	The video recorded can be shorter. Then if possible can record also the answering technique for the past year question
4	I think the class should be conduct in both method and moreover the recorded video should be put in YouTube channel so that it can help others too
5	The voice and contents of some videos are not clear sometimes. It is confusing when doing revisions.
6	I hope each online class will be given some real exam questions and guide us how to solve it and explain it deeply.
7	I think that the asynchronous class you have conducted was good but in my opinion, the video was a bit lengthy. How about dividing it into a few small parts, so that it will be more focused.
8	Syllabus learning through asynchronous is good but the assignment was not smooth. Due to lack of hands on activity
9	Put student in a college for a better internet connection
10	Need to increase teaching time as many parts of the knowledge cannot be taught effectively as face to face class
11	Make more interesting recorded video because we will see it always

Figure 3: CLO achievement

Figure 3 shows the average CLOs achievement for 201920202 students. Both CLOs for alternative online assessments (project based learning) are achieved well, meanwhile for the traditional online synchronous assessment (online final examination and online tests), the CLOs still shows encouraging achievement even though the classes were implemented online because the students still involve with the hands-on of circuit design simulation that can help their understanding.

Conclusion

In this paper, the effectiveness of online learning for Digital System course has been studied. The online learning was conducted into synchronous and asynchronous learning. From the survey, it shows that most of the students which is about 75% were satisfied with the online learning implementation. They said that the current way of online learning is the most efficient since it helps students better at self-learning. The asynchronous learning helps students to re-learn or re-watch every time the student got lost or forgotten. Around 25% of students totally disagree with online learning because of internet connection and it is hard for them to ask questions directly. Further improvement is needed to address internet connection such that students will follow the learning smoothly.

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We would like to thank Universiti Teknologi Malaysia for providing excellent teaching and learning environment. Also thanks to UTMLEAD for providing teaching and learning courses.

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The Effects of Online Collaborative Reading on Students' Reading Performance and Anxiety

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Highlights: This study was conducted at the English Department of Herat University, Afghanistan. This research project was intended to enhance the reading comprehension skills of the sophomore students via online collaborative reading class. The purpose of the study was to examine the stability of the online collaborative reading. It also investigated the reading anxiety and reading perception of the participants of the study towards their course.

Key words: Reading performance; anxiety; collaborative reading; perception

Introduction

The focus of the study is on collaborative aspect of the reading comprehension course. NALI approach is implemented in this research and is explained as following:

Novelty

This research project is novel since it has never been studied in the EFL context of Afghanistan; moreover, there are limited studies on collaborative reading comprehension skills, and there are even less studies on teaching collaborative reading classes via online platforms. As a result, this study added to the body of literature in teaching English language.

Creativity

This research project was creative in the sense that it blended the collaborative reading activities to enhance the reading comprehension of the EFL sophomore students and it was offered via online platform. Moreover, the researchers considered the context of the study and the poor economic situation of the people, therefore, offered the course through a free of cost platform, Schoology (Schoology.com). For carrying the online collaborative reading class, the researchers designed specific reading modules to improve students' reading comprehension which can be used as an example of how to bring collaboration in an online class by other instructors.

Innovativeness

It was an innovative study since it has never been investigated in the EFL context of Afghanistan; moreover, online platforms have never been utilized before in the country as a form of delivery. It is also innovative in the sense that collaborative reading has never been integrated with online platforms.

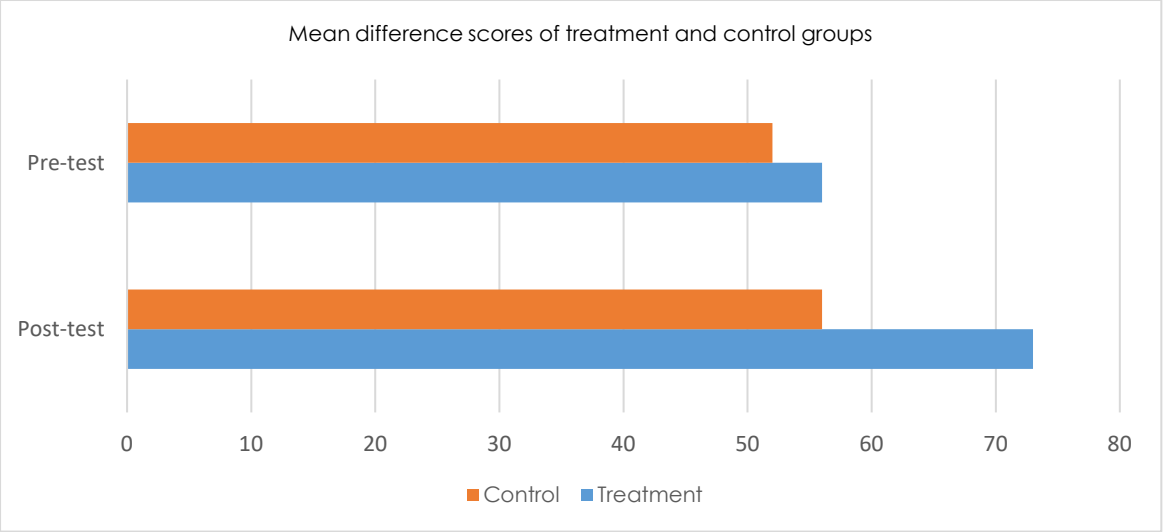
Applicability

Because of the pandemic and no access to physical classes due to Covid-19, teachers should create an environment that students participate more and have interactions. The findings of the study suggest that collaborative activities were successful in enhancing the reading comprehension of the Afghan EFL students in the English department. The implemented activities and the online platform utilized in this study are easily accessible and applicable in any context; there is no need for fancy gadgets or constant access to the internet. In groups, students can assign a specific time and work on the activities whenever they are free. The online platform used in the research has also an app that can be downloaded on smartphones; this makes it easier for students to work wherever they are without access to a computer.

Impact

The impact of the study was measured through the post-test and the questionnaires participants filled at the end of the treatment. The findings of the study imply that collaborative reading activities were successful in developing the reading comprehension of the Afghan EFL sophomore students. Therefore, it can be concluded that collaborative reading activities had a positive impact on the overall reading comprehension development of the participants. Moreover, the accessibility of the platform for the students and their responsibility to collaborate in doing the assignments helped to decrease their reading anxiety.

Figure 1.1 presents the difference between the post-test scores of the treatment group and control group:



Methodology

Data for the current study is collected through quantitative research design.

Participants

- Purposive sampling was used to collect data from students.
- Students in sophomore class (23 Female and 12 Male) were set to be the participants who were taught online collaborative reading.
- The treatment was six weeks.

Data was collected through:

- Pre-test (to create a baseline)
- Post-test (to measure the progress of the students' reading comprehension)
- Questionnaire

Findings and Discussion

The results of the post-test reinforce the findings of Gao (2012) and assert that when students work together in solving a problem, composing an answer, respond to critical thinking questions, they perform significantly better than when they are left on their own. Online collaborative reading course, not only developed the reading comprehension of students, but it also helped in developing autonomy, interdependence, and accountability among learners, As McGroarty and Calderon (2005) state, collaborative learning facilitates interaction among learners, develops accountability and interdependence, and promotes autonomy among learners

The results of the test on anxiety of participants show that there is a statistically significant difference between the anxiety level of the control group and treatment group as p=.000. Likewise, studies by Gao, 2012; Rahman, 2015; Reznitskaya et al., 2009; Chinn et al., confirm that collaborative learning helps in reducing stress and the anxiety level of students which ultimately results in better learning outcomes.

The data obtained from the perception questionnaire suggest that online collaborative reading group had a positive attitude towards the online reading classes. Students demonstrated a positive perception of their online collaborative reading course through their responses on items in the questionnaire; they found the course to be all-inclusive, comfortable, and cooperative.

Acknowledgement

We express our gratitude to all professors at the Language Academy, UTM JB, who inspired us to work harder and guided us through every step of this research project.

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Harnessing Critical and Creative Thinking During Pandemic

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Highlights: Critical and Creative Thinking Course is one of the general courses offered to teach students how to use critical and creative thinking techniques in order to become realistic, innovative and far-sighted. Accordingly, various projects involving the use of critical and creative thinking have been conducted as part of the course assessment. The Crowdfunding Video Contest that was organized was meant to equip students with various skills such as entrepreneurial thinking and leadership skills. This program helps UTM produce graduates who are not only knowledgeable and morally sound, but also versatile. Through the feedback received, students are very satisfied with this program and various skills and graduate attributes have been acquired through this Program such as thinking skills, global citizens and others.

Key words: critical and creative thinking; crowdfunding; skills; graduate success attributes

Introduction

There are many studies and statistics released by various parties on the marketability of graduates. The New Straits Times newspaper dated February 18, 2020 reported that according to the Ministry of Education, graduates have difficulty securing a job after completing their studies. Thus, it was believed that students need to be further equipped with various skills and knowledge that can improve employment opportunities.

In addressing the continuous problem of unemployment among graduates, the University has equipped its students with knowledge and skills to become an innovator. Innovation is important not only in an organization but also individually. However, innovation alone is not enough to bring one's idea to reality.

One of the trends that can demonstrate innovation is Crowdfunding. Crowdfunding is a way of financing a project or business by raising money from a large number of people who contribute relatively small amounts, usually via the Internet (Belleflamme, Lambert & Schwienbacjer, 2012). Here are the reasons for this project:

- Crowdfunding is the latest trend that can help those who are creative and innovative to succeed in their ideas. Therefore, it is appropriate for UTM students to be exposed to this matter as many students do not know about Crowdfunding. This project is believed to be a platform for students to explore something new while using their critical and creative thinking.
- Students who register for the Critical and Creative Thinking Course consist of Year 1, 2 and 4 students from various engineering fields. Accordingly, such final projects are believed to help new students in promoting their work and final year students to prepare for the working world.
- COVID-19 does not limit Teaching and Learning (T&L) activities. Projects like this are among the programs that are can still be carried out during the Movement Control Order (MCO) to continue the T&L activities.

Objectives of the Program – Crowdfunding Contest

The followings are the objectives of the Crowdfunding Contest:

1) As a platform for students to explore something new (Crowdfunding);
2) To apply their critical and creative thinking in producing good video content;
3) To nurture students to utilize their knowledge and skills not only to innovate but also to give back to the society; and
4) To assist UTM in producing students with graduate attributes such as communication skills, critical thinking, and problem solving skills, and teamwork skills.

NALI in The Contest

The movement restrictions due to Covid-19 has given us opportunities to fully adopt what we have already planned for blended learning. Therefore, the contest which is as part of assessment is to integrate online learning with constructive alignment. In addition, students are given the opportunity to apply what they learn together with the skills that they have to produce outcomes that can be measured consistent with outcome based education.

As requirements of the contest, students were given five (5) themes and based on the given theme, they are required to make three minutes video to tell a story and set tones of the video. The video were assessed based on the followings criteria:

1) The video features a human face making a direct appeal for a donation;
2) The video is not more than 3 minutes long;
3) The video is donor-centric;
4) The campaign video tells a compelling story;
5) The quality of the video is professional;
6) The videos evokes an emotional responses;
7) The video successfully conveys the importance of the project; and
8) The video makes the viewer wants to make donation.

It was obvious that students not only apply what they learnt but also use their creativity and skills to fully utilize others' innovations (crowdfunding) for the community. And the impact can be seen when one of the groups successfully collected about RM500 for a school in Sabah.

Method Involved

There is no specific method involved. Students, however, are required to use their scholarship skills to search for relevant information before they produce the video. Content is very important as it relays the messages that is supposed to be disseminated and this is especially true for crowdfunding, which is known for its specific cause.

Qualitative method was used to analyze students' responses and feedbacks on the course and specific analysis was performed to study what they have learnt out of this contest.

Findings – The Contest Outcome

On the date of this competition, all students were off campus due to Movement Control Order (MCO). Accordingly, the competition was conducted online. Overall, students have used Thinking Skills, which is critical and creative thinking apart from optimizing other skills such as group work skills, information searching skills, technology skills and others. In total, 113 students were involved, 23 videos were contested. The winning team is from School of Biomedical Engineering and Health Sciences for first and second place and third place is from School of Mechanical Engineering.

Based on the qualitative analysis, majority of students feel that the Critical and Creative Thinking Course is important and an interesting course. In addition, most of the students feel that the contest was enjoyable, and they learnt new skills such as video editing and furthermore, the contest improved their team working skills especially when they need to work remotely. The followings are some of the responses from children:

> "I have never done a crowdfunding video before and never done a volunteer with the community who lives in rural area. For me, it was a fun experience even we are not able to go by ourselves to that schools to see the real condition but still I am proud to take part in this project."
> – Nur Natasha Amyra Ahmad Azizi, UHAK 2022, Seksyen 02

> "……now I am so interested in learning more about crowdfunding how can I help poor people by encouraging others to do charity. Moreover, the assignments and the project which the professor gave to us throughout the course have boosted my knowledge, presenting, and research skills in crowdfunding and video editing."
> – Abdallah Nasser Sayyed Hammam, UHAK 2022, Seksyen 02

> "……crowdfunding video as project works very well as students tend to have fun in learning rather than just reading and learning facts…. In fact, through those activities, not only we can gain knowledges regarding the theories learned but also other things or skills."
> – Muhammad Ajwad Wahinuddin, UHAS 2122, Seksyen 04

> "……The project on crowdfunding was great exposure. I never really knew about crowdfunding and how it works but upon completing the group project, I understand the importance of giving back to the community by helping the needy in all possible ways that I can."
> – Lavanya Andy, UHAS 2122, Seksyen 15

In addition to the above, ePPP shown that students satisfied with the generic skills that was embedded in the course. As shown in Table 1, ePPP scored for sections involved are higher than the faculty's and university's mean.

Table 1: Lecturer's ePPP Score (Generic Skills)

Mean	Course Code/Section		
	UHAK2022 (02)	UHAS2122 (04)	UHAS2122 (15)
Lecturer's Mean	3.74	3.85	3.86
Faculty's Mean	3.61	3.61	3.61
University's Mean	3.56	3.56	3.56

Conclusion

Despite the challenges faced by the students being off-campus with online interaction following pandemic, this program is deemed to be successful. There are also international students who are in other countries like Indonesia but this did not stop them from communicating online. Overall, the Program has successfully met its objectives, and developed students who can face challenges and pressures.

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iSTEM-PCK Teaching Module for Pre-Service Teachers

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Highlights: The iSTEM-PCK teaching module for teaching iSTEM strategy is a 5-weeks training that focused on the 5 levels of iSTEM integration which are: Single, Combine, Multiple, Engineering design projects, and Fully integrated STEM disciplines and 5Es (Engage, Explore, Explain, Elaborate, and Evaluate) phases of learning. The iSTEM-PCK teaching module for teaching iSTEM strategy is a 5-weeks training for pre-service teachers. The intervention that tested the effectiveness of this product shows that the iSTEM-PCK teaching module has good validity and reliability to be used for training pre-service teachers in implementing iSTEM strategy. The results also indicate enhancement of pre-service teachers' PCK on teaching iSTEM base curricula.

Key words: 5 levels of iSTEM integration; Teaching Module; *5Es phases of learning; pre-service teachers*

Introduction

Integrated Science, Technology, Engineering, and Mathematics (iSTEM) is a new pedagogy that emphasises transdisciplinary among Science, Technology, Engineering, and Mathematics (STEM) by eliminating the boundaries between the disciplines and teaching the subjects as a single entity (Nadelson & Seifert, 2017). Inline to this, the developed nations viewed iSTEM education as interconnected and focused on the connection between all the STEM disciplines and learnt as one subject(Bennett & Ruchti, 2014). The reality in teacher education training is that each of the STEM disciplines is taught as a separate field of study in which the pre-service teachers were only receiving training in the separate and single field of STEM (Galadima et al., 2019b). The consequences associated with this kind of iSTEM instruction is that it is likely that separate STEM pedagogy may fail the learners to comprehend the connection between the STEM disciplines. Adversely, if iSTEM pedagogy is not introduced, it would affect the learners' productivity. Hence, for stakeholders to move from teaching separate STEM disciplines, the iSTEM-PCK training module would serve as a guideline for formulating the strategies to implement the iSTEM-based pedagogy.

The iSTEM-PCK teaching module used the concept of pedagogical content knowledge (PCK) introduced by Shulman Lee in his research in the year 1986. This highlighted the need for combining both the pedagogy and content understanding in training the learners in teaching strategy. In acknowledging the relevance of PCK in the teaching of iSTEM strategy, the study of Yıldırım and Sidekli (2018) expressed the need to have pedagogical knowledge, STEM knowledge, and interdisciplinary correlations associated with 21st-century real-life for teachers to apply in teaching iSTEM strategy. In specific, it can be said that pre-service teachers with a sound understanding of PCK will play a vital role in teaching a specific content of iSTEM (Lauermann & König, 2016). In contrast, the teachers with limited understanding of STEM content and pedagogy will have a problem in teaching iSTEM (Yıldırım & Sidekli, 2018). This research organised to cover the five levels of integration adapted from the study of Burrows and Slater (2015) that include: Single, combine, multiple, engineering projects, and fully iSTEM disciplines (Galadima et al., 2019b).

Project Objective

The iSTEM-PCK teaching module was designed to transform and improve the PCK of the pre-service teachers from teaching separate STEM disciplines to teaching iSTEM-based curricula.

The Novelty, Innovativeness and Creativity of iSTEM-PCK Teaching Module

Table 1 provides the elements, description and iSTEM-PCK structure used in understanding the novelty, innovativeness and creativity

Table 1: Elements, Description and iSTEM-PCK structure

Element	Description	iSTEM-PCK
Novelty	Incremental change of the product	iSTEM-PCK teaching module is a new systematic structure for training pre-service teachers that provide iSTEM training by integrating 5Es model of teaching and 5-levels of integration of STEM
Innovativeness	Involve changing the way education operates	Single discipline →Transdisciplinary, Single discipline →iSTEM strategy iSTEM training + PCK+5Es+5 levels of integration Brainstorming Micro-teaching Hands-on activities
Creativity	Internal ability to come out with something unique	design, presentation and delivery style of of the module

The iSTEM-PCK teaching module was designed to transform the curriculum from receiving training in separate STEM disciplines to integrated STEM-based practices. Additionally, the learning outcomes of the iSTEM-PCK teaching module had described under the STEM product, PCK application, 5Es model of teaching, model of integration, and mode of training (see Table 2) in understanding the five levels of integration (Galadima et al., 2019b).

Table 2: compasrison of STEM products

Authors/year	**STEM product**	**PCK**	**5Es**	**Model of Integration**	**Teacher training**
Shahali *et al.* (2016); Shahali *et al.* (2015)	Bitara-STEM Module			Interdisciplinary	✓
Akaygun and Aslan-Tutak (2016)	CLT-STEM Module			Interdisciplinary	✓
Kasim and Ahmad (2018)	PRO-STEM Module		✓	Interdisciplinary	✓
Galadima *et al.* (2019a, 2019b)	iSTEM-PCK Teaching Module	✓	✓	Fragmented - Full Integration	✓

Applicability and Impact

The module has been empirically tested showing that the pre-service teachers have improved their PCK in teaching iSTEM (see figure 1). The project helped the 54 pre-service teachers to acquire skills necessary for connecting the STEM disciplines into one cohesive teaching and learning pedagogy for solving real-world problems. The content validity index (CVI) and inter-rater reliability are 0.97 and 0.86 respectively. The experts' validation showed that the iSTEM-PCK teaching module is interactive; that the course module is valid for the instruction; the iSTEM-PCK teaching module is very appropriate and sufficient to measure the PCK of the learners; clarity of the connection between and among the iSTEM level of integration; appropriateness of the objectives in measuring the content; and suitability of the content for the iSTEM-PCK teaching module.

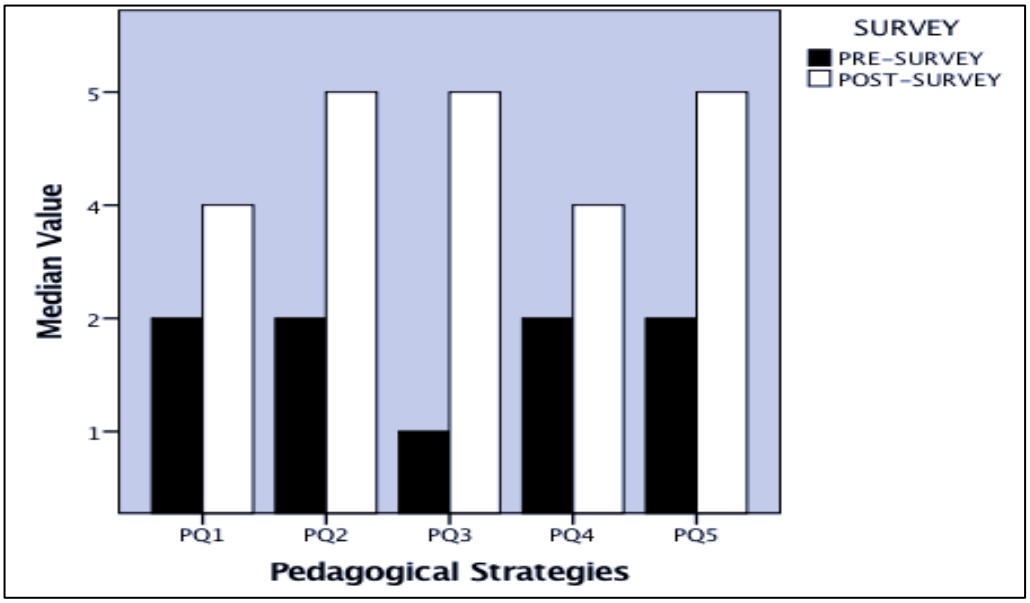

Figure 1: Scores of pre-test and post-test on i-STEM PCK test in pre and post-test

Figure 1 shows an interesting increase in the survey of the post-test of the pedagogical content knowledge of teaching iSTEM after pre-service teachers participating in the iSTEM-PCK course training.

Commercialisation Potential

The iSTEM-PCK teaching module has potential to be commercialized to other teacher training institutions, pre-service teachers, and in-serviced teachers can use the module in professional development course throughout the world.

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Intellectual Property Law Snake & Ladder Game (IPSL)

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Highlights: Teaching law to non-law students is challenging and learning law for non-law students is also challenging. Law is always known as 'dry subject', 'boring' and others. As such there is a need for a new way of teaching to attract these non-law students to learn law in which the best way is through gamification. This paper documents the design of a board game, Intellectual Property Snake and Ladder (IPSL), and investigates its effectiveness in undergraduate teaching for a Law module, namely the Intellectual Property Law and Management. It's aimed to expose the students on the types of intellectual property, governing law, procedures for intellectual property application, rights of intellectual property owner and its importance.

Key words: Intellectual Property; Law; Board Game; Snake and Ladder Game

Introduction

In educational practice, there are two overarching comparable approaches which are distinguished as the conventional normative pedagogical practice in which the teacher plays an authoritative role in the teaching process against the critical reflective pedagogical practice in which learners are encouraged to engage and reflect in an inquiry community directed by the teacher. (Lipman 1991). In social constructivist learning theories, knowledge is best acquired when it is socially situated and built through an interaction of one's own thoughts and experiences with the ideas of others (Otting and Zwaal 2007). A reflective environment that encourages autonomous interaction and collaboration between instructors and learners can improve learners' knowledge acquisition and cognitive development greatly (Song and McNary 2011). Following this social interactionist and constructivist learning philosophy as the basis of reflective and critical pedagogy, learners are encouraged to engage in active learning, including to discuss, argue, negotiate ideas, and collaboratively solve problems (Jonassen et al. 2003). The main role of instructors therefore shifts from being one that is instructional to one that facilitates learning activities giving rooms for the students to be self-directed.

Teaching law to non-law students is challenging and learning law for non-law students is also challenging. Law is always known as 'dry subject', 'boring' and others. As such there is a need for a new way of teaching to attract these non-law students to learn law in which the best way is through gamification. Game-based learning (GBL) broadly refers to the use of games in the classroom or in some other learning setting as a teaching / learning tool. GBL are practices that Chan et al. 2017). Sandford and Williamson (2005) lists the following key characteristics of game based learning: (a) it supports learning by presenting particular challenges to participants; (b) it has rules governing individual interactions; and (c) it provides participants the experience of exploring different tools with different consequences. This paper documents the design of a board game, Intellectual Property Snake and Ladder (IPSL), and investigates its effectiveness in undergraduate teaching for a Law module, namely the Intellectual Property Law and Management. This is a board game to teach non-law students on the basic principles of intellectual property. It's aimed to expose the students on the types of intellectual property, governing law, procedures for intellectual property application, rights of intellectual property owner and its importance. The game would be played by the students in the class where students are divided into four persons per group. They are required to roll the dice to determine their turn. If a particular group answered the question correctly, it had another turn to roll the dice and advance. The group of students that managed to reach the top of the board was declared the winner. When a player lands on a square, talk about the concept and what it means. If they land on a question, answer it. Don't know the concept or can't answer the question? They lost their turn to roll the dice. This game is expected to achieve course learning outcome (CLO) 1 and CLO 2 of the subject where are students would be able to possess the legal knowledge on the concepts, rights, and liabilities of parties in relation to different areas of Intellectual Property law and Illustrate the relevant laws under Intellectual Property which is related to industrial needs respectively.

Content

IPSL Board games is introduced to bring joy and fun in learning law and at the same time increase the student's understanding on issues related to IP Law. This teaching tool is designed to assist in understanding the fundamental concept of IP Law. Gamification is especially important for legal education today, especially as students, graduates, and professors appear to agree that learning law can be deeply unpleasant. Hence, educators are encouraged to explore the alternatives, to turn the legal activity into addictive activity and turn pedagogy into an enjoyable captivating experience (Ferguson, 2016). To incorporate novelty, the IPSL board game encompasses the elements of

humor, movement, multi-sensory instruction, quiz game and music. The game stipulated a creative platform to an entirely new and efficient way of learning through the unique experience of law formation and exploitation. It offers opportunities to apply, experiment, and objectively analyze legislation and its consequences and making the abstract legal ideas to become concrete in interactive, immersive, safe and creatively inspiring environments. IPSL force the students into spotlight, making them communicate in unusual and uncomfortable ways, or encouraging them to take giant lateral leaps in their teamwork and significantly stretch their minds. IPSL allow the players to strategize, work and play together toward a common objective. Even if the game is a competitive game, the inherent goal of each player still lies in cooperating with each one to achieve the common objectives i.e. to Win while having fun. The use of board games is beneficial to non-law students to enhance their knowledge in difficult, dense, and boring subject like law. Without doubts, playing IPSL can generate high engagement and motivation for the students. I firmly believe that playing board games does accomplish many of the more serious pedagogical objectives, at the very least, it puts nervous students at ease and thus, able to learn while having fun.

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Reinvigorate Low Carbon Education & Awareness via Iskandar Malaysia Ecolife Challenge (IMELC) 2020 Breakthrough

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Highlights: Despite the challenges in continuing the Iskandar Malaysia Ecolife Challenge 2020 (IMELC 2020) during the Movement Control Order (MCO), the need to nurture Year 6 students with Low carbon education and awareness must go on. Social media platforms such as Facebook and Telegram were leverage as platforms to reach the schools and teachers for briefing and updates. Google Classroom and Google Meet were also optimized to disseminate low carbon education as well as to stimulate the learning and teaching activities by interactive digital materials. More than 15,000 students and teachers in Johor have benefitted from IMELC 2020 in the midst of COVID-19 and MCO.

Key words: Low Carbon Education, Learning and Teaching via Google Classroom

Introduction

Iskandar Malaysia Ecolife Challenge (IMELC) is the all in module comprises training for the school teachers, students learning activity on Low Carbon Society (LCS) and school's efforts in reducing the carbon emission. IMELC is conducted through formal and informal education at school setting by using the IMELC workbook designed by the UTM team comprises on Low Carbon education, reflection, challenges and activities. The objectives of IMELC, specifically are (1) to foster LCS awareness among primary students, teachers and their families (public community) in Iskandar Malaysia and beyond through school education; (2) to disseminate knowledge, awareness and practice of LCS among Iskandar Malaysia community and beyond through primary students and teachers; (3) to reduce carbon emission in Iskandar Malaysia through awareness and education; (4) to create a Low Carbon Society for Iskandar Malaysia by year 2025.

This module was then package into a competition to boost the motivation of Year 6 students in Johor (Phang et al., 2016). Over the pass 7 years, IMELC was executed around September and October, right after the end of UPSR examination. IMELC helps students to enjoy, learn and practice low carbon activities before they enter secondary schools. The IMELC operational setting does not limit to the school's population, it encourages the involvement from the parents, families and communities at the school's vicinity. It is hoped that IMELC can help to realize the target of carbon reduction for Iskandar Malaysia by year 2025 as outlined in the Low Carbon Society Blueprint for Iskandar Malaysia 2025, which was endorsed by the Prime Minister of Malaysia, and presented at the United Nations Framework Convention on Climate Change (UNFCCC) the 18th session of Conference of Parties (COP 18) in 2012.

IMELC Module

The IMELC module is aligned with the New Innovation in Teaching and Learning (NALI) model which emphasizes on training, implementation, research and evaluation via student centered learning (SCL) approach. Strategically, IMELC also aims at achieving the Sustainable Development Goals (SDG). In IMELC, it comprises training on the knowledge and awareness on LCS, and how to use a workbook designed by UTM to educate the students. The training is given to the appointed IMELC teachers from schools who will also act as IMELC coordinators at school level. Furthermore, the workbook includes Information on climate change and LCS, self-check survey on LCS practices, a series of eco-household accounting activities to look at their contribution of carbon emission from their home, reflective report of each accounting activities and other learning activities that are related to both LCS and primary school Science and Mathematics curriculum. At the schools level, each school runs campaigns to try and reduce the use of electricity and water of the school. Each school must submit the utility bills to UTM before and after IMELC to measure the success of their effort. Schools also need to collect as much recycling items as they can in a certain designated period. The original receipts of recycling sold to vendors must be submitted as proofs. All three modules will be evaluated to determine the 15 best schools that are eligible to participate in the last phase of IMELC which is the final presentation. A school will send a group of students to present what they have learned about LCS and what can they do to make Iskandar Malaysia a Low Carbon region. The data collected from IMELC execution in the schools were collected for evaluation and improvement for the following years.

IMELC Execution

Interestingly, IMELC started from 2013 with only 23 pilot schools, however due to the positive impacts that changed the behaviour of the students as well as the teachers (Phang et al., 2017), it was continually improved and expanded over the year as follows.

Year	2013	2014	2015	2016	2017	2018	2019	2020
Schools	23	80	228	231	345	403	475	484
Students	3,790	15,623	27,628	27,125	34,000	40,000	45,000	15,021

For few years, the stakeholders of IMELC tried to digitize the operation of IMELC, however due to the limitation on the school internet, network, location and facilities, most of the IMELC schools requested to continue using the printed workbooks via the normal approach. However, as the COVID-19 hits Malaysia and the whole world, IMELC 2020 needs to be redesigned to suit the current condition. Since the plans for IMELC 2020 is to expand to 546 Schools in Johor, but due to the pandemic and based on the current status of the schools, IMELC is now open to schools as an optional competition where the factors of schools networks and facilities were considered. The digitization of IMELC 2020 kicked off early this year by finding the best approach that could suit with the school condition. Following the ADDIE approach, a number of factors were taken into account such as student safety, students data, teachers ability to track the students, researcher data and etc. After conducted study on all the available approach to execute the module and disseminate workbook to the students and teachers, Google Classroom (GC) is the best platform that allows the teachers and students to access and interact during the movement control order in the most convenient, little training and at zero cost. Nevertheless, the mechanism to create at least 546 GC is quite complex as there is no duplication of GC in the settings. Few meetings with experts in the educational technology were conducted for consultation. Hence, UTM team has come up with the decision to use GC, where respective GC account will be created manually for all the registered schools to ensure that the teachers and students receive the same learning.

The Master Folder of GC was tested with stakeholders and selected IMELC school coordinators to ensure that the GC can be used by the teachers and students. In this stage, a number of feedback were collected from the stakeholders and teachers to improve the GC. Among the matters addressed by the schools are the limitation of the school computer lab, networks, students do not have the devices to access GC and etc. Some schools reveal they could not commit IMELC in the new norm because they have to focus on the formal curriculum first. Hence, it is decided that any numbers of voluntary schools and students are accepted for IMELC 2020. To create the IMELC GC for the voluntary schools, a google form was created to collect the details of all IMELC coordinators from schools. Unexpectedly, at least 591 schools from Johor (and some from outside of Johor) expressed their interest to participate in IMELC 2020 under the new norm. Despite the challenges faced by the teachers to execute IMELC in the new norm, to date 15,021 students have successfully enrolled in the IMELC 2020 GC.

In the usual setting of IMELC training for the teachers, the IMELC team will visit schools for the IMELC briefing, nevertheless, this year, social media platforms were leveraged to ensure that information can be reached ubiquitously by the schools despite the MCO. The teachers were briefed using FB Live streaming from Facebook Page of RCE Iskandar while occasional announcements of IMELC were given through Telegram. To date the FB Live Streaming of the briefing of IMELC have 4.1k views. The briefing includes the opening addresses by all the main partners of IMELC, briefing of the competition formats and GC, and question and answer session. In this session, the registered teachers also received the invitation of their schools' GC with specific coding. A helpdesk is setup to answer any questions on GC by the registered IMELC teachers. The session for GC IMELC helpdesk were scheduled for each district to allow all the teachers to engage and discuss the issues and challenges using the google classroom.

Values of IMELC

Leveraging ICT for education
Moving from printed workbooks to GC, this has given the opportunity for the UTM team to innovate the learning material to suit with the GC in an interactive manner. By applying the concept of NALI, the educators in UTM bridged the concept of active and systematic strategy with the use of digital teaching materials. Blended learning approach were used by teachers for the IMELC implementation with their students. The GC were used by the teachers to interact and discuss with the students, share the learning materials and also monitor all the assignments done by the students. The students were also introduced with the materials from websites, YouTube, Quizziz and action plans of JPNJ and IRDA.

STEM Education
Through IMELC, the students learned the simulation for calculation of carbon emission from electrical and water consumption. Through this simulation activities, students can relate the amount of carbon release from the activities in their house. In comparison to the normal IMELC approach, usually teachers find it difficult to explain and demonstrate the 'implication' of water and electric usage towards carbon released in the atmosphere, nevertheless through IMELC 2020, more meaningful learning experience can be achieved. From the recycle activity, students can also relate the impact of poor waste management to the nature.

Holistic Development
IMELC also assists in holistic development of students in terms of nurturing discipline and civic responsibility towards nation, and the environment by promoting awareness in their responsibility towards nature. In addition, through recycling activities, students are encouraged to involve their family members in this program. In a way, this activity nurture student leadership.

School Community Project
This program encourages the involvement of each school member including the school janitor, canteen worker, teachers, students, school administrators and parents. Reducing electrical and water consumption is a whole school effort and students are encouraged to be ambassadors of IMELC and educate the school members on environmental sustainability. This program also educates the school administrators, apart from providing a safe and conducive environment for student learning, it is also important to structure a sustainable system for waste management.

Thinking skills and Language proficiency
In every activity in IMELC, students were prompted for reflection to think how their effort (i.e. managing waste, conserving electric and water consumption, monitoring family vehicles usage) contributes to a sustainable environment. This reflection activity could trigger their higher order thinking, deep reasoning, and improve their language proficiency as they are asked to relate the planned activities with the impact to the environment.

Impact of IMELC

Despite the challenges in executing IMELC 2020, the enriching journey in digitizing IMELC for Year 6 students for low carbon education and awareness has significantly achieved the desired outcomes of NALI on entrepreneurial academia. Through IMELC 2020, it brings academia, industries, governmental agencies and school communities closer together to boost the economic value of processes of transfer and application of knowledge between university and strategic partners. UTM provides in kind for creating, monitoring and maintaining 483 GC that may cost more than RM40,000. IMELC 2020 receives financial support from the Sustainable Energy Development Authority (SEDA) Malaysia and SWM Environment Sdn. Bhd. Due to the applicability of GC designed by the UTM, IMELC has successfully secured funding from the United Nations Development Programme (UNDP) to further digitize IMELC to meet with the schools' need starting 2021. IMELC is also in midst of moving from pedagogy towards andragogy learning mode that emulates the Learning Materials (Digital Resources) in the GC. The root problem of global warming was given and discussed in IMELC to stimulate the student to learns and get into actions. The meaningful learning experience were acquired by the students through the completion of all the challenges. The impact of the program can be seen clearly through the participation of the students and teachers in the GC. Despite the COVID-19, the schools believe that IMELC should be continued and should encourage the students to be more aware of the low carbon issues. Interestingly, IMELC 2020 still empowers the students to be the advocates of low carbon initiatives at schools and home. This could not be realized without the efforts given by the school teachers in ensuring the learning and teaching of IMELC run throughout the duration of the competition. It is believed that the module designed in GC are engaging as well to allow the students to be empowered to lead a low carbon life. Since the competition is still running, the data of waste management, water and electric bill usage could not be fully generated. Usually the impact can also be seen through the data generated on the water and electric bill reduction and waste management by the schools and individuals. That translates the actions of the students to reduce the carbon. IMELC has received acknowledgment through the following awards: Okayama ESD Award Global Prize 2018, ITEX (International, Invention, Innovation & Technology Exhibition) 2017 Silver, PECIPTA 2017 Bronze, and United Nations University (UNU) Regional Centre of Expertise on Education for Sustainable Development (RCE) Annual Award for Outstanding Flagship Project (Climate Change) 2015.

Acknowledgement

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of Low Carbon Cities (GTALCC) and Regional Centre of Expertise on Education and Sustainable Development, United Nation University. This research was also funded by the Research University Grant Program: [Q.J130000.2653.17J29] initiated by UTM.

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Different Thinking Hat Jigsaw Group Approach for Sampling and Sample Preparation T&L

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Highlights: Sampling and sample preparations is an important topic in the analytical chemistry course, as the students will apply the knowledge practically in the real situation in their career. The concept of garbage in and garbage out also complied in this topic. Failure in the proper sampling and sample preparations specifically for every purpose of analysis will result in the irrelevant results of analytical process. Previous conventional technique for the teaching and learning (T&L) process of this subtopic showed that the students were not really performed in the assignment of the case study given. However, after introducing the Different Thinking Hat Jigsaw Group activity, the outcome of the sampling and sample preparations planning from the students exhibit the better performance base on the similar rubric. Besides, the activity also could be applied for online T&L approach based on the response from the survey. Thus, this new developed method for sampling and sample preparations T&L could be applied either face-to-face or online approach for better understanding among the students.

Key words: Different Thinking Hat Jigsaw, chemistry, teaching & learning

Background and Objectives:

Many educators have agreed in recent years that the aim of schooling is to cultivate effective decision-makers, innovative and self-reliant problem solvers, and meaningful learners and thinkers who are willing to adapt well in the 21st century. Problem-based learning (PBL) has recently become fairly common in chemistry classrooms as a instructional technique (Ayyildiz and Tarhan 2018). Besides, cooperative learning is used as a way to train students to work in communities where there is a need to align efforts to work for a shared purpose in diverse job contexts, at home and in the community. One of the popular cooperative learning approach is Jigsaw. The jigsaw technique can enhance cooperative learning by making each student responsible for teaching some of the material to the group. In this technique, students are members of two different groups, the "home group" and the "jigsaw group." (Doymus 2008). Another method in the cooperative learning approach is the six thinking hat approaches by De Bono, in this method students will be given a specific role of thinking, and normally represented by the colour of their hats. This method is beneficial for developing creativity in learners as it nurture the range of diverse ideas, and secondly persistence, focusing on an issue in a more detailed way(Zacharia, Xenofontos et al. 2011).

In Analytical Chemistry, sampling and sample preparation is a broad and well-defined field important to many fields of use, such as medicine, environmental science, biochemistry, pharmacology, geology and food science. There are minimal tools that can be used by educators to teach the basic and advanced aspects of sampling and sample preparations planning for specific techniques and process(Costa, Dugo et al. 2012). In agreement, Cooperative and PBL teaching and learning methods are the creative and practicable student-centred approaches for this purpose. In this regard, students should be engaged via a structured and guided plan. Thus, jigsaw group activity combined with the different thinking hat methods, which was derived from the 'six thinking hats' group discussion technique was applied to teach the sampling and sample preparation planning in the analytical chemistry course.

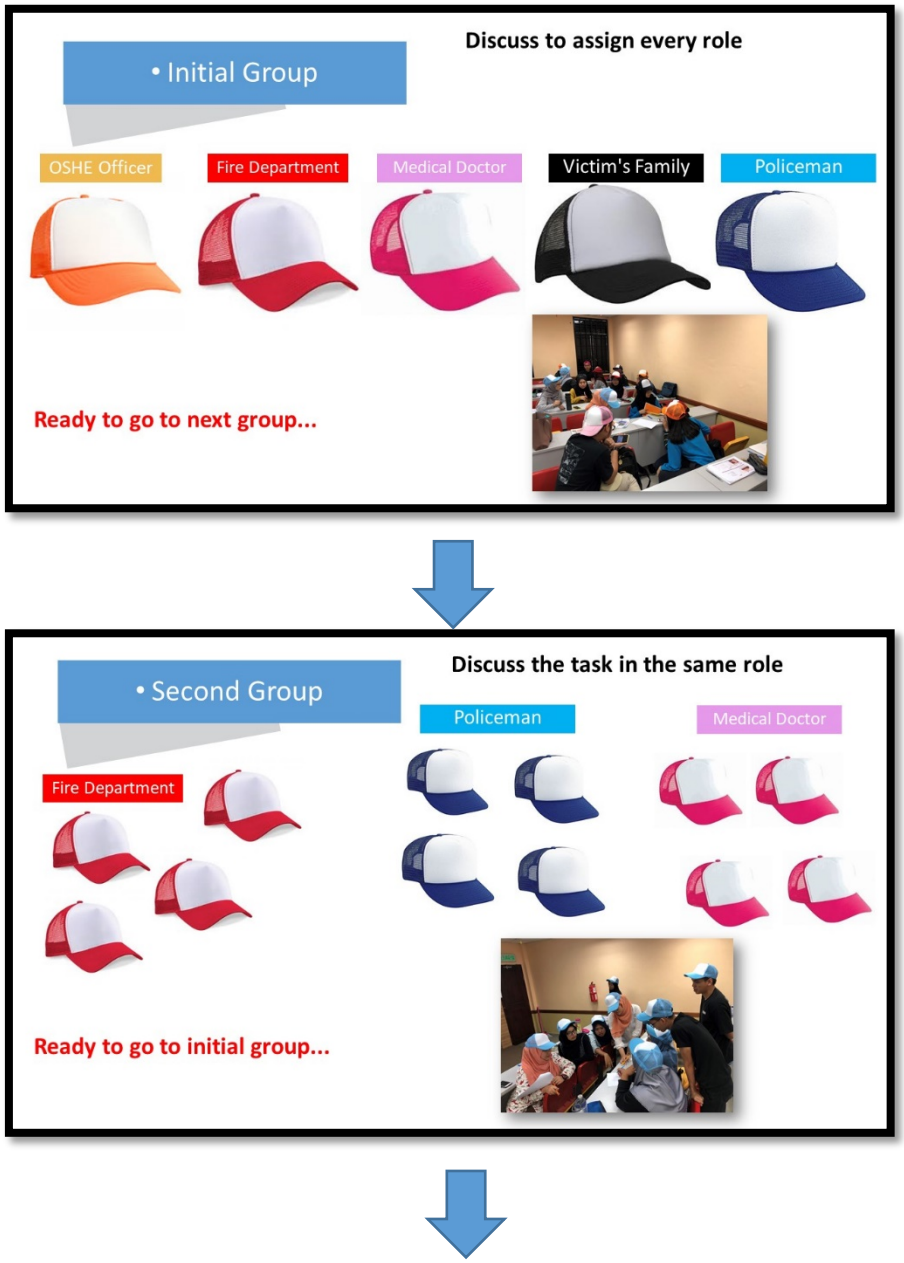
Methods and Approaches:

In the analytical chemistry course, the students need to understand practically in sampling and sample preparations planning before the sampling process being performed. Previously, this topic was taught by conventional group discussion by giving the case scenario as the problem-based learning. The latest technique being applied currently which is the Different Thinking Hat Jigsaw Group seems to exhibit a better performance in the students understanding. During the class, a scenario of given whereby a corpse was found in a burned house. The students was divided into several groups at the beginning of the class, and each group must have 5 members. Then, they were given a role for each person in the group as a policeman, fire and rescue forensics, chemist, department of safety and health, medical doctors and also victim's family.

Every person with different role wearing the different colour of hat as identification. Each person with the same role was then discussing in the group of the same role for the needs of sampling and sample preparation process to investigate the case using analytical instruments. After that, they have to assemble back in their initial group to discuss the needs and precautions steps of every role in the group. Lastly, every group will propose the best practice for the sampling and sample preparation process answering 5 questions (what sample should you take?, how to store the samples?, what is the expected analyte?, what is the matrix that could be in the sample?, and how you should analyze the samples?). The outcomes of the assignment were submitted in form of mind map, flow charts, paragraph, and

other type of written planning. Figure 1 shows the flow on how to organize the activity. The sample of the assignment outcomes were taken from the students of Analytical Chemistry for Engineering (SSCK1203) course with conventional group discussion and the newly developed method of T&L. Lastly, the outcome of this activity was compared with the previous conventional group discussion outcome base on the similar rubric as describe in Table 1 comprising the criteria of understanding of the scenario of the case study (20%), organizations of the written planning (10%), quality of sampling methodology (25%), general chemistry terminologies and theories (25%), interest level (10%), and timeliness (10%).

As a proof for this newly developed method could be organize via online T&L approach, a survey was organized among 47 respondents of SSCK1203 students enrolled in the latest semester of study which were completely learned the course online. The students had gone through the similar assignment with the same method that already developed.



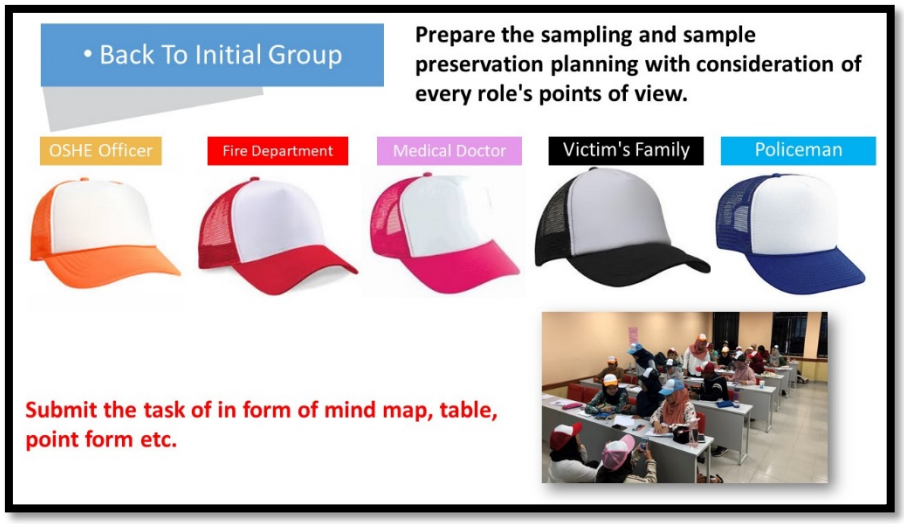


Figure 1: Flow chart on how to organize the Different Thinking Hat Jigsaw Group

Table 1: Rubric for the assignment outcome

Task : Case study of Sampling and Sample Preparations for the to analyze the sample for the given situation (a corpse was found in a burned house).					
Criteria	weight	Exemplary 4 Yes	Accomplished 3 Yes, but	Developing 2 No, but	Beginning 1 No
Understanding of the scenario of the case study	20%	☐ Directly relevant	☐ Somewhat relevant	☐ Remotely related	☐ Totally unrelated
Organizations of the written planning.	10%	☐ Good organization; points are logically ordered; sharp sense of beginning and end	☐ Organized; points are somewhat jumpy; sense of beginning and ending	☐ Some organization; points jump around; beginning and ending are unclear	☐ Poorly organized; no logical progression; beginning and ending are vague
Quality of Sampling Methodology (Related to the Case Study in PBL).	25%	☐ Supporting details specific to subject	☐ Some details are non-supporting to the subject	☐ Details are somewhat sketchy. Do not support topic	☐ Unable to find specific details
General chemistry terminologies and theories.	25%	☐ No errors	☐ Only one or two errors	☐ More than two errors	☐ Numerous errors distract from understanding

Interest Level	10%	☐ Vocabulary is varied; supporting details vivid.	☐ Vocabulary is varied; supporting details useful	☐ Vocabulary is unimaginative; details lack "colour"	☐ Basic vocabulary; needs descriptive words
Timeliness	10%	☐ Report on time	☐ Report 10 minutes late	☐ Report 30 minutes late	☐ Report ≥ 1 hour late

Results & Discussion

Base on the outcomes of the similar case study assignment submitted, the score from the new developed methods are higher with average of more than 90% as compared with the conventional methods, with average marks below 70%. Figure 2 exhibit the examples of the submitted assignment outcome from the students group taught with the Different Thinking Hat Jigsaw Group method while Figure 3 displays the outcome from the conventional method of teaching.

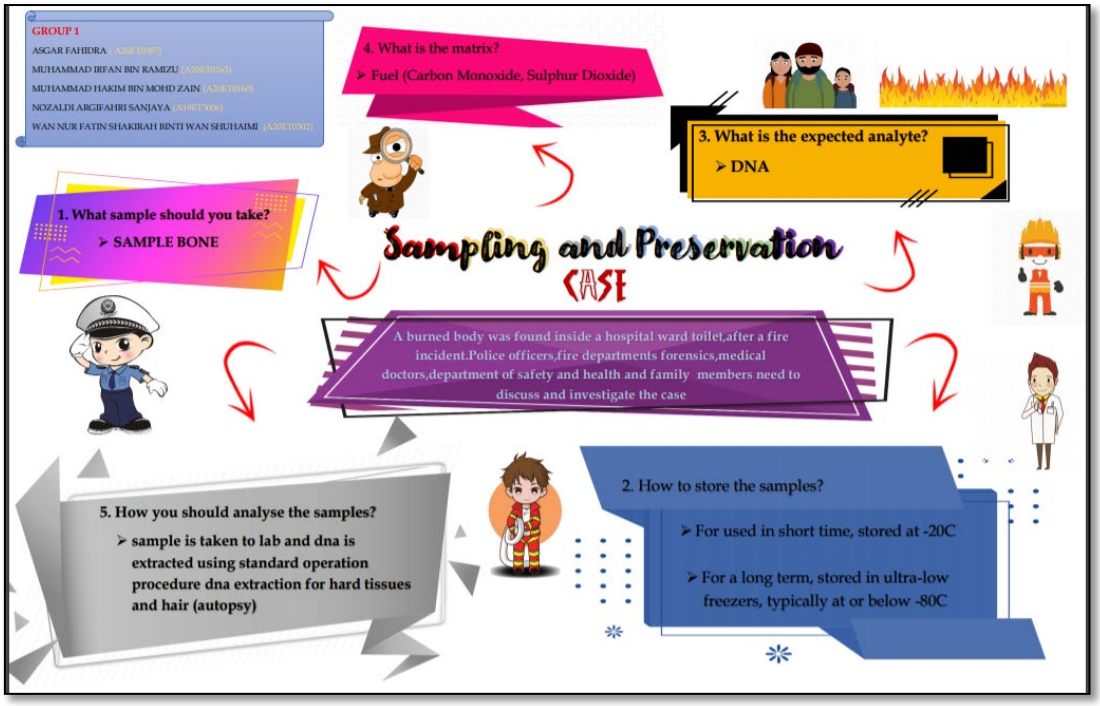


Figure 2: Examples of the submitted assignment outcome from the students group taught with the Different Thinking Hat Jigsaw Group method.

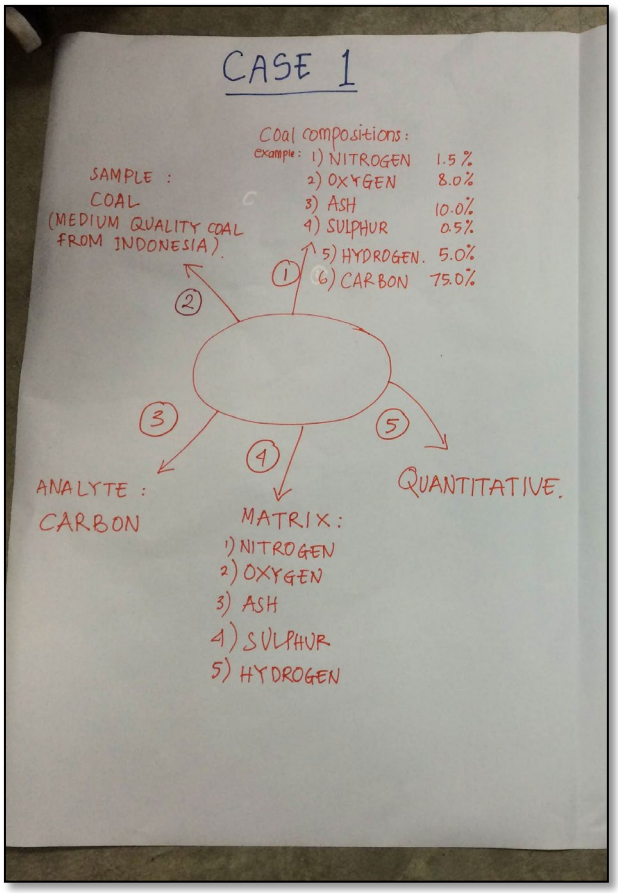
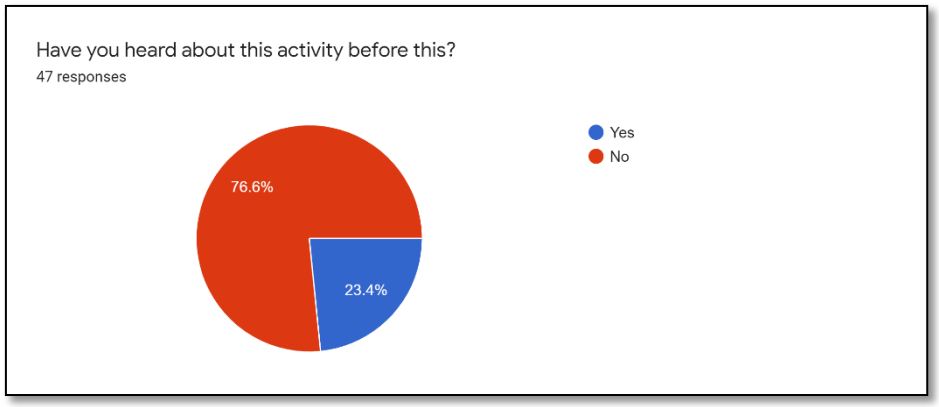
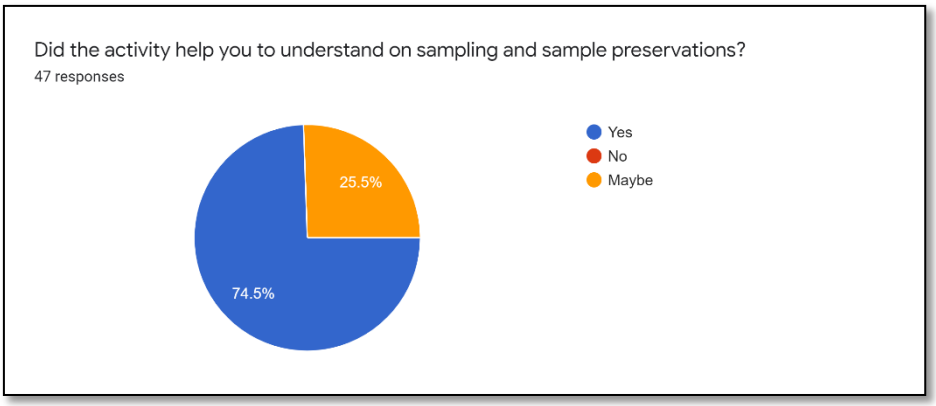
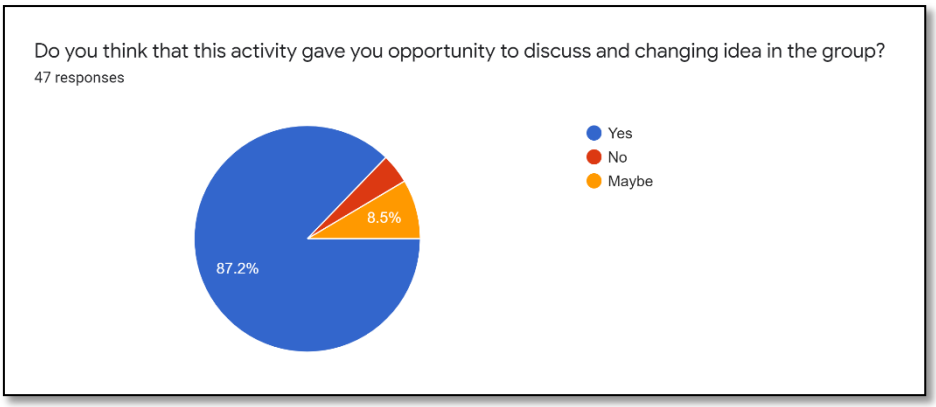


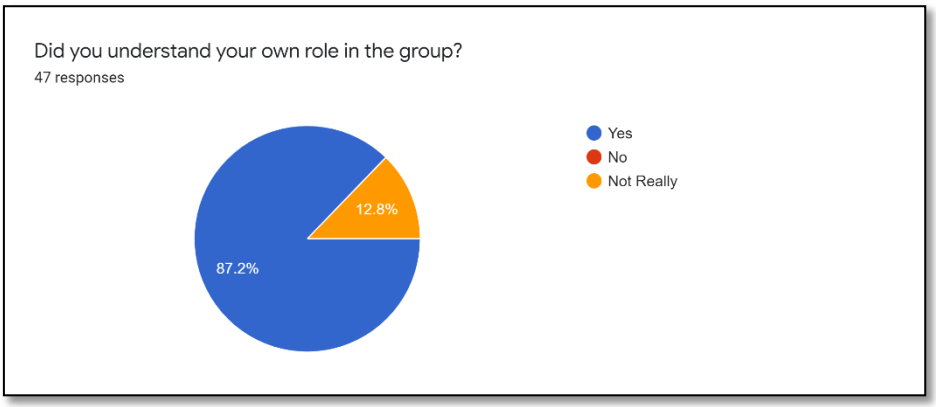
Figure 3: Examples of the submitted assignment outcome from the students group taught with the conventional group discussion method.

Besides, as a concrete proof for this method could be organized via online T&L approach, the survey result showed that all the 47 respondents from the students gave the positive responds towards this method. Figure 4 exhibits the percentage of the responds in form of pie charts.









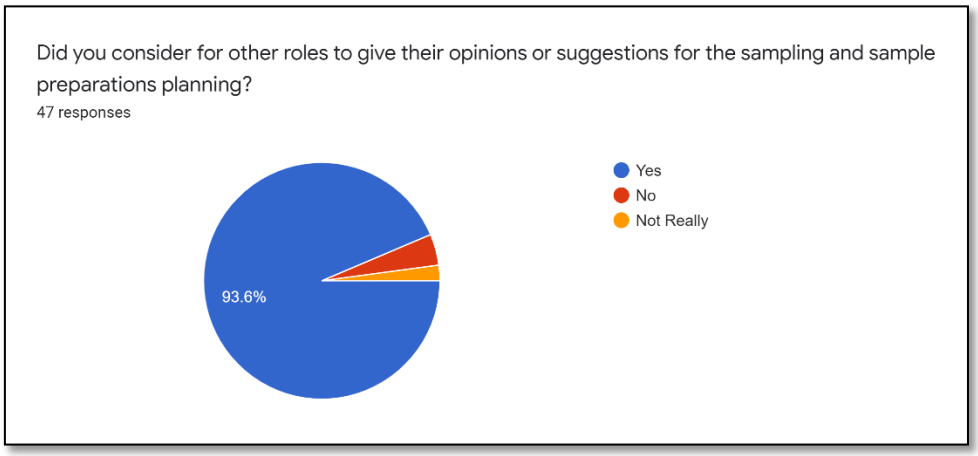


Figure 4: The pie charts of responds percentage from the students taught with online approach.

Conclusion

Different Thinking Hat Jigsaw Group is an efficient technique sampling and sample preparations T&L. Besides, this activity also can be performed via online learning whereby students need to discuss virtually in different groups before completing the assignment or task in this activity.

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Students' Improvement in Performance, Conception and Interest on Compound Nouns Learning Via Inomaj

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Highlights: This study aims to investigate the usage of innovative flashcards called Inomaj to help students' performance, conception, and interest in compound nouns learning. This study was conducted on year 1 students. This study is based on a quantitative method that was collected through classroom assessments, pre, and post-tests, observations, and questionnaires. Before the treatment session, students were given a Pre-Test to determine their performance in the classroom assessment. The student's attitude during the treatment session was recorded by the observation method through the checklist. Post-tests were given to respondents after the treatment session ended. The questionnaire was conducted to collect information and feedback from them after using Inomaj. All data obtained is analyzed based on the content analysis approach. The findings show that the usage of Inomaj is effective to improve their performance in compound nouns learning. The post-tests result showed about 83% improvement. Similarly, students also interest to learn and able to conceptualize compound nouns.

Key words: Inomaj, flashcards, students, compound nouns

1. Introduction

Compound nouns are very unique and productive vocabulary. This statement was also supported by linguists such as Asmah (1993), Abdullah and Ainon (1994), Liaw and Abdullah (1994). Although different terms have been used by Asmah (equivalent phrase), Abdullah and Ainon (compound phrase), & Liaw and Abdullah (plural noun), they are actually referring to the same word formation. The usage of plural nouns still widely discussed despite many linguists wrote relevant articles. Moreover, the type of compound nouns that want to study also does not have uniformity in detailed terms and descriptions. The confusion as to whether it is a compound word or phrase is still a question. These conflicts have in fact opened up opportunities for clearer explanations, especially in this study. By Asmah (1982), Malay as the 'equivalent phrase' that give the impression in the minds of the Malays who like to look at the incidence and nature in pairs. The adverb phrase described by Asmah (1982) is the word that describes the verb. Examples of name phrases, work phrases, personality phrases and adverbial phrases. Her opinion is same with Abdullah and Ainon (1994) which states that one of the special features of the Malay language is like to use the two words overlap meaning. They believed that there are two types of word phrases. The first type consists of two words that have almost identical meanings. In describing Malay's compound nouns, the prevailing analysis was conducted by members of the language is based on the shape, type, function and meaning. Generally, most researchers agree on the classification of Malay compound nouns in terms of functionality. For example in the study by Asmah (1982), Liaw and Abdullah (1994), Abdullah (2006) and Nik Safiah Karim, Farid M. Onn, Hashim Haji Musa and Abdul Hamid Mahmood (1989, 2008). They divide compound words into plural nouns, plural verbs, and plural adjectives. For students in primary school, it is very important for them to learn compound noun. This is because they must able to make conception. So, one of the efforts to help them is by trying to innovate them with an innovative learning tool.

2. Problems Statement

2.1 *Low Achievement*

Year 1 students from 1 UTM got almost lower marks in classroom assessment.

2.2 *Misconception*

Students cannot generalize about compound nouns term.

2.3 *Unattractive Learning*

They easily get bored and focus cannot be done.

3. Methods

3.1 Reflect

3.1.1 Classroom Assessments Result

Table 1. Pre-test Result

Number of Student	Marks
2	0-20 (Very Low)
5	30-50 (Low)
3	60-70 (Moderate)
-	80-90 (Good)
-	100 (Excellent)
10 Students	**Total**

3.1.2 Observation Result Before Treatment

Table 2. Preliminary Observation Analysis

No.	Statement	Yes	Per/ (%)	No	Per/ (%)
1.	Student get ready when teacher enter the class.	2	(20)	8	(80)
2.	Student keep on focusing during lesson.	1	(10)	9	(90)
3.	Student participate very well during lesson. .	2	(20)	8	(80)
4.	Student can easily understand about the topic given.	1	(10)	9	(90)
5.	Teacher able to use an interesting method during lesson.	1	(10)	9	(90)

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3.1.3 Questionnaire Result Before Treatment

Table 3. Preliminary Questionnaire Analysis

NO.	STATEMENT	Yes		No	
		No.	(%)	No.	(%)
1.	I know and understand about compound nouns.	1	(10)	9	(90)
2.	I completely love to learn the compound nouns topic so much.	1	(10)	9	(90)

3.	I can say any compound nouns taught by teacher.	2	(20)	8	(80)
4.	I can say other words that form compound nouns.	0	(-)	10	(100)
5.	I can apply some compound noun to form new words.	0	(-)	10	(100)

3.2 Plan

i. The game will be started by a judge and followed by two players.
ii. The judge will explain the rules of the game. Each game will be given the same red and yellow marked flash cards.
iii. The first player will first choose a picture card to place in the middle of the Inomaj site.
iv. Players will answer and place the correct card on the basis of a picture card. Each answer will be checked by the judge via AR tool named Aurasma.
v. Each question that is answered correctly will get 10 marks. If the player fails to answer correctly, the player will ger no score.
vi. Students who successfully complete the score and finish the game are considered winners.

3.3 ACT

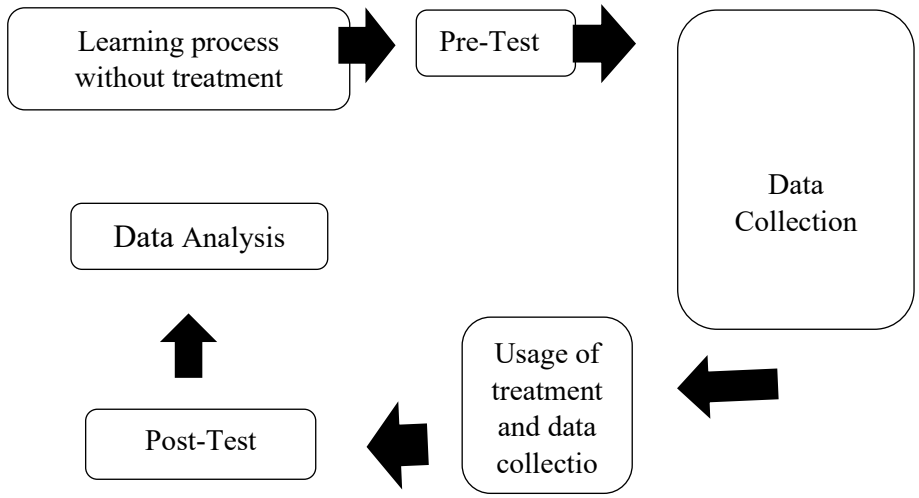

Figure 1. The Action

3.4 Observation

The results will be analyzed and interpreted in the form of tables and percentages to examine the results of the study through post-test result, checklist, and questionnaire.

4.0 Result and Findings

Table 4. The Comparison Marks Result

Subject	*Pre-Test Mark* (%)	*Post-Test Mark* (%)	Score Advancement (%)
1	20	50	30
2	60	90	30

3	50	90	40
4	20	50	30
5	40	80	40
6	30	50	20
7	70	100	30
8	30	80	50
9	50	70	20
10	60	100	40

Table 5: Questionnaire Analysis

NO.	STATEMENT	Yes		No	
		No.	(%)	No.	(%)
1.	I know and understand about compound nouns.	9	(90)	1	(10)
2.	I completely love to learn the compound nouns topic so much.	10	(100)	0	(-)
3.	I can say any compound nouns taught by teacher.	9	(90)	1	(10)
4.	I can say other words that form compound nouns.	8	(80)	2	(20)
5.	I can apply some compound noun to form new words.	9	(90)	1	(10)

Table 6. Checklists Analysis

NO.	STATEMENT	Yes		No	
		No.	(%)	No.	(%)
1.	Student get ready when teacher enter the class.	9	(90)	1	(10)
2.	Student keep on focusing during lesson.	10	(100)	0	(-)
3.	Student participate very well during lesson. .	10	(100)	0	(-)
4.	Student can easily understand about the topic given.	7	(70)	3	(30)
5.	Teacher able to use an interesting method during lesson.	9	(90)	1	(10)

5.0 CONCLUSIONS

Based on the findings, students showed improvement in their achievement. They love to learn in a conducive atmosphere. In addition to this, innovative flashcards called Inomaj came with an augmented reality tool that impressed them to have fun in learning. In fact, students know how to provide a brief, complete description of the compound nouns. Some respondents can give more than one

example from another word. The affective aspect has also shown positive changes. Subjects became supportive, active, enthusiastic, and interested during lessons. In the future, the concept of learning for fun by using a technology designed by educators will help to boost their knowledge. Indeed, the current industrial revolution 4.0, need students to come with a high level of knowledge and skills.

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wARna Interactive: Home Interactive Wall for Virtual Colouring Contest

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Highlights: At the present moment, COVID-19 pandemic has influence group colouring activity done in public. Large display interaction or interactive wall is one of the activities that promote interest in colouring among kids. The present invention related to redesign collocated social interaction of large display into remote social interaction to bring the interactive wall experience at home for virtual colouring event, more particularly a framework called wARna Interactive. wARna Interactive is a home interactive wall that integrates with mobile augmented reality application using a device to screen concept with online multi-player service and introduce a new transition interface using virtual reality and virtual colouring contest features.

Key words: Virtual reality; augmented reality; large display; colouring contest;

Introduction

Colouring activity with pens and paper is a natural activity and an important experience not just for children but also adults to practice and express their creative skills. To gain interest and attention of kids, making these creative activities are the main challenge faced by educator and guardian. Three ways usually used to promote interest in colouring are colouring event, mobile-based augmented reality colouring book application and interactive wall or large display interaction. Previously, we have developed an interactive wall for group colouring activity, but unfortunately due to COVID 19 pandemic, the activity or event is not able to be organized physically and thus this project needs to be improved further. Furthermore, we have developed product such as mobile augmented reality colouring book application called wARna. However, because such an application is not developed for a group activity, the latter is not easy for group activity interaction. Figure below shows an example interactive wall from [teamLab, 2013].

Figure 1: Example interactive wall called Sketch Aquarium from teamLab.

The aims of this project to introduce home interactive wall and virtual colouring contest to promote interest in colouring by remotely from user home. There are three objectives to be achieved:

1. To redesign an interactive wall for home use, then integrate with mobile augmented reality application using a device to screen concept.
2. To introduce remote social interaction for a home interactive wall to interact from distance using multi-player service.
3. To introduce a new transition interface in mobile augmented reality application by using virtual reality to provide an immersive experience.

4. To develop an event schedule and evaluation system for virtual colouring contest.

In the first objective, we redesigned the interactive wall for suitable used at home. Furthermore, the home interactive wall application then developed to be used for normal user computer specification. The mobile augmented reality colouring book application then integrated to the interactive wall using server where the painted sheet will be uploaded to a server then automatically sent to the home interactive wall application. We redesigned collocated social interaction of the previous interactive wall into remote social interaction from user mobile applications through multi-player online service where user can send input and interact from the mobile augmented reality application to the interactive wall application. The new interaction design enables interaction from user's home and virtually interact with each other. Next, we introduced a new transition interface using virtual reality interface to provide an immersive experience in virtual world. Lastly, we developed an event schedule system and judging system to enable colouring event from user homes. This system will evaluate the uploaded colouring page from user mobile phone application. The appointed judge will evaluate online through this system and the result will be notified in the home interactive wall application.

Content

Based on (Olsen et. al., 2020) to enhance social interaction can be divided into role of technology, social design objective and design approach. In this project, we saw the role of technology for this project is encouraged, the social design objective chosen is engaging people in collective activity and suitable design approach is open space for a shared activity. The designed approach of this project mostly influenced by this work (Fonseca, 2020). Figure 1 shows below depict the new design interaction on how mobile-based augmented reality colouring application, interactive wall and colouring event integrated. Based on this proposed interaction, previously colouring contest and the interactive wall that previous organized for group activity is redesigned to for home activity by integrating with mobile augmented application and introduce home interactive wall for home version.

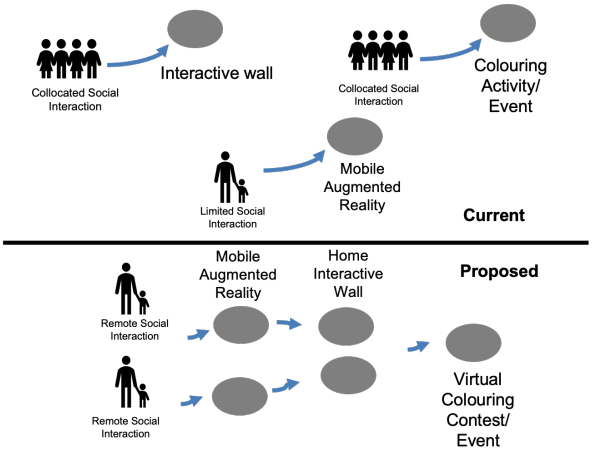


Figure 2: Current interaction verse propose interaction.

The novelty of this project is an introduction of virtual colouring event to promote interest in colouring at home using home interactive wall and mobile application through remote social interaction developed specifically for colouring activity at home. In addition, we extended the user experience for current mobile application into the immersive experience using low-cost VR cardboard. Furthermore, we introduced virtual judging system to vote the uploaded participant artwork.

The idea generation this project influenced by COVID-19 pandemics issues that push educational activities shifted to the online medium and require internet capability. This project also designed on limitation of current interaction interactive wall and mobile-based AR application to promote colouring interest activity at home. Lastly, conventional colouring event still manually managed and not interactive to be done from distance.

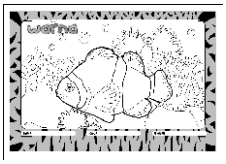
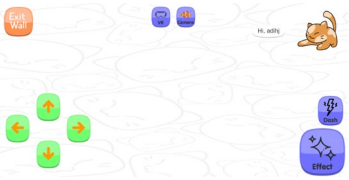
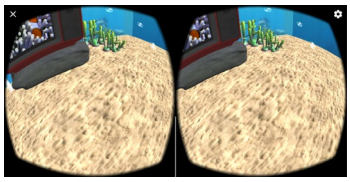
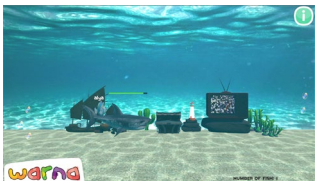
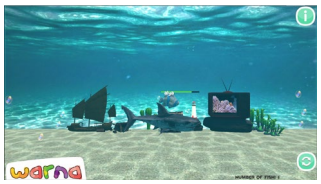
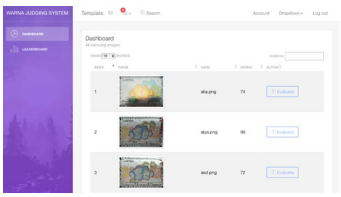
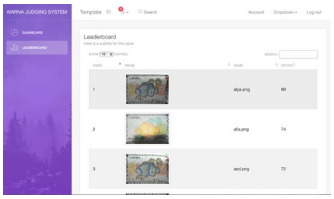
The innovativeness in this project can be highlighted, we introduced a new concept of interactive wall called home interactive wall where user can experience it from home. This project also extending user experience by introducing virtual reality transition interface for mobile AR using low-cost VR cardboard. Introduction of virtual judging process eliminates the manual process of the conventional contest.

This project is developed to support the New Academia Learning Innovation Model where traditional colouring activity still using collocated social interaction that requires a group of participants at the same time and same place. Our project improves existing three solutions in promoting interest in colouring into one solution. Colouring contest can be done remotely that can participated from different school or kindergarten at the same time. At the same time, suitable for home activity during free time.
Impact to student's learning that planned in this project is kids can have more interest in colouring activity at home by redesigned current solution to solve this issue. Another impact is to instil competitiveness spirit among participant

by enhancing their creativity and thinking. This is also suitable home activity during this COVID-19 pandemic with only a handphone and a computer at home, the user can start the activity.

There is still no scientific evaluation process in this work. Therefore, the next steps for this work are to evaluate the performance improvement of the interaction developed for wARna Interactive. We hope this project can be expanded more in term of gamification and suitability designed for kids between 4 to 6 years old.

Table 1: Interface for four application developed for this project.

User activities		
Colouring Process	 Colouring Sheet	 Painted Version
Mobile application interface	 Augmenterd Interface	 Mobile control Interface
	 3D View Interface	 Virtual reality Interface
Home interactive wall	 First Interface	 Interaction Interface
Host interactive wall	 First host Interface	 Host Interaction Interface
Judging system	 List of participant Interface	 Leader board Interface

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Kursus Pengurusan Jenazah Online (KuPJO)

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Sorotan: Setiap manusia yang hidup pasti akan menghadapai kematian, oleh itu pengurusan jenazah merupakan suatu kefardhuan yang terletak di bahu masyarakat. Hukum pengurusan jenazah merupakan fardhu kifayah yang bermakna kewajipan bagi umat Islam yang hanya sempurna apabila dilaksanakan oleh sebahagian orang. Di dalam Islam terdapat empat kewajipan orang hidup terhadap seseoran jenazah Muslim iaitu memandikan, mengkafan, menyembahyangi dan menguburkan jenazah. Dengan adanya perlaksanaan kursus jenazah dalam talian ini atau di namakan sebagai Kursus Pengurusan Jenazah Online (KuPJO) ia akan memudahkan orang ramai untuk memahami dan mengaplikasikan kaedah pengurusan jenazah berdasarkan syariat Islam.

Kata Kunci: Pengurusan Jenazah, Teknologi Segerak, Pembelajaran Dalam Talian

Pengenalan

Pada masa kini bagi terdapat beberapa kaedah aplikasi teknologi yang digunakan bagi memudahkan masyarakat untuk memahami dan menguruskan jenazah mengikut lunas syariat yang betul antaranya penggunaan laman web (Yusoff, Ahmad Fkrudin Mohamed, 2017) dan aplikasi telefon (Aghnia, *et al.,* 2014). Walaubagaimanapun, kaedah tersebut disasarkan sebagai alat bantuan mengajar kerana bersifat sehala dan mempunyai limitasi interaksi sekiranya terdapat persoalan dan ketidak fahaman. Kaedah teknologi yang diaplikasi bagi Kursus Pengurusan Jenazah Online (KuPJO) ini adalah teknologi segerak (*synchronous*) iaitu teknologi dengan komunikasi secara langsung (Contoh: Webex, Collaborate,Adobe Connect, Zoom, Facebook Live dll.) yang membolehkan komunikasi dua hala antara pengajar dan peserta (Martin, Stamper, & Flowers, 2020).

Pembentukan Modul bagi Kursus Pengurusan Jenazah Online

Dalam Kursus Pengurusan Jenazah Online (KuPJO) ini, peserta akan dapat mepelajari proses pengendalian empat kewajipan bagi pengurusan jenazah iaitu kaedah memandi dan mengkafan secara praktikal kendiri dengan dibimbing oleh tenaga pengajar. Manakala video digunakan bagi

menunjukkan cara solat jenazah dan juga pengebumian. Kaedah ini membantu peserta untuk berpeluang mengikuti kursus jenazah walau dimana mereka berada.

Melalui Kursus Pengurusan Jenazah Online (KuPJO) ini, aktiviti pembelajaran bagi memahami proses dan perlaksanaan pengurusan jenazah dapat dilakukan pada lokasi dan waktu yang lebih fleksibel. Keperluan kepada penjarakkan fizikal dan dan larangan perjumpaan kumpulan besar disebabkan penularan wabak Covid-19 tidak menghadkan orang ramai untuk terus mempelajari fardhu kifayah ini.

Kursus Pengurusan Jenazah Online (KuPJO) ini akan dilakukan secara berkala melalui teknologi segerak seperti Webex, Google Meet bagi memastikan peserta lebih memahami proses pengurusan jenazah ini. Kursus ini mempunyai 4 modul iaitu;

Jadual 1: Modul Kursus Pengurusan Jenazah

Modul	Topik
1	Menziarahi orang sakit dan menghadapi kematian
2	Memandikan jenazah
3	Mengkafankan jenazah
4	Solat jenzah & Kebumi

Kesimpulan

Perlaksanaan Kursus Pengurusan Jenazah secara dalam talian menggunakan medium teknologi bersifat segerak seperti 'Facebook Live' dapat memberikan impak yang besar kepada masyarakat khususnya individu yang ingin mengetahui perlaksanaan dalam pengurusan jenazah. Pengurusan jenazah merupakan suatu kewajipan yang bersifat fardhu kifayah dimana tanggungjawab melaksanakannya jatuh kepada kelompok masyarakat setempat (Aghnia, et al., 2014). Jika seseorang jenazah tidak diuruskan maka akan jatuh hukum berdosa kepada setiap individu yang berada di komuniti tersebut. Maka wajib terdapat individu yang tahu menguruskan jenazah Muslim yang telah meninggal dunia. Melalui Kursus Pengurusan Jenazah Online (KuPJO) ini ia dapat memberikan peluang yang lebih besar kepada setiap individu bagi menuntut ilmu pengurusan jenazah dengan lebih felksibel sekaligus dapat melaksanakan tanggungjawab fardhu kifayah ini.

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SCAN'N'GO

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Pengenalan: ScanNGo merupakan satu Google form (single form) bagi semua urusan sekolah. Sistem ini dihasilkan untuk tujuan meringankan bebanan tugas guru. Dengan adanya ScanNGo guru-guru hanya menghantar data yang diperlukan melalui google form.Guru-guru boleh menghantar data melalui talipon pintar mudah alih. Dengan berbuat demekian analisa data dan Format Maklumat yang diperlukan dijana secara automatik. Penjanaan data dan laporan akan disimpan didalam cloud Google. simpanan data dan laporan ini hanya boleh di akses oleh , Guru Besar, guru-guru Penolong kanan dan guru yang dilantik untuk urusan tertentu. walaupun penggunaan QR CODE telah wujud di sekolah-sekolah namun ianya adalah satu Code untuk satu Urusan. Saya telah menghasilkan satu QRCODE untuk semua urusan. Ini akan menjimatkan masa guru-guru. Urusan yang telah diintegrasikan ialah , Kehadiran Murid RMT, Kehadiran Murid Kelas Tambahan UPSR, Laporan kawalan Kelas, Laporan Perhimpunan,Laporan RMT, Minit Curai, Penggunaan Bilik-Bilik Khas, Pencapaian sekolah, Kehadiran Guru KOKU. Inovasi ini telah memberikan impak yang sangat baik di kalangan guru-guru. guru-guru tidak perlu mencari buku kehadiran atau laporan pada setiap hujung bulan bagi melengkapkan. Ini kerana sistem ini akan mengisi semua data yang diperlukan secara automatik, kemas dan teratur. guru hanya cetak dan simpan untuk tujuan rujukan.

Key words: Qrcode; Google Form; Laporan; Scan

Introduction (SCAN"N"GO)

Saya dapat memerhatikan kekangan guru-guru untuk menyediakan dan menyiapkan pelbagai laporan yang diperlukan oleh pihak sekolah/Daerah/JPN dan KPM. Para Guru kelihatan Stress dan tiada berminat terhadap Pdpc disebabkan kekangan penyediaan laporan, kehadiran murid dan sebagainya. Tugasan sampingan yang banyak menyebabkan mereka tidak dapat menumpukan terhadap murid.

Oleh itu , bagi mengurangkan bebanan penyediaan laporan, kehadiran murid saya telahpun membuat inovasi ini untuk tujuan meringankan bebanan tugas guru. Saya dapat perhatikan Penyediaan Laporan RMT dan Kehadiran RMT melibatkan seorang guru untuk satu kelas. Setiap hari guru-guru perlu bawa buku kehadiran ke kantin dan menandakan kehadiran murid. Setiap bulan guru-guru perlu membuat perkiraan kehadiran secara manual untuk melengkapkan laporan.

Idea baru saya yang dihasilkan ialah dengan penghasilan satu QRCODE dan sekali imbas semua tugasan guru boleh disediakan dengan memasukkan data yang minima. Input data minima dan output adalah seperti format yang dikehendaki oleh Ketua Jabatan, PPD,JPN dan KPM. Innovasi ini adalah mesra pengguna.

Guru-guru tidak lagi duduk dihadapan komputer atau lapptop untuk menyediakan laporan. Tidak perlu mencari pencetak untuk mencetak laporan. semua laporan di simpan di dalam Google drive. hanya boleh dicetak sekiranya diperlukan. Innovasi ini juga membantu Green technology. Konsep adalah Sistem Pengurusan sekolah Digital. Dimana kearah penggunaan dan pengaplikasina IR4.0.Innovasi ini juga menggalakkan guru-guru ke arah "Future Ready Educators (FREE)". Segalanya di dalam tapak tangan. Guru-guru hanya menggunakan talipon Pintar sahaja untuk menghasilkan laporan. Innovasi ini membolehkan guru-guru memberikan Fokus yang tinggi kepada PDPC dan kemenjadian murid.

Kandungan (Scan'n'go)

Kandungan Projek ini adalah seperti berikut :;

1. Objektif Innovasi :
   Untuk meringankan bebanan Tugas guru.

Untuk menggalakkan minat bekerja seronok dan tidak menyusahkan.

Untuk membolehkan memberikan tumpuan yang optimum terhadap Pdpc\ dan Kemenjadian Murid.

2. Pendekatan NALI dalam innovasi ini : Idea baharau iaitu hanya satu QRCODE sahaja disimpan oleh guru-guru. Tidak perlu keliru dengan ada pelbagai QRCODE. Innovasi ini Mesra pengguna dan senang digunakan di mana-mana sahaja tanpa risau tentang pencetak, komputer. Kos untuk menghasilkan Innovasi ini adalah RM0. dimana pengetahuan ICT dan Idea inovasi dan.mengkaji masalah yang di hadapi oleh para guru.
3. Methodology Kajian : Saya gunakan kaedah kuantitatif. Penjimatan masa yang tinggi. dimana sebelum innovasi ini perekodan kehadiran RMT mengambil masa yang lama. satu hari guru perlu mengambil satu jam untuk menanda kehadiran bagi setiap kelas. tetapi dengan adanya innovasi ini hanya 1 minit mencukupi untuk menanda kehadiran Murid RMT keseluruhan sekolah. sama juga untuk penyedian laporan dan Kehadiran yang lain. Guru-guru hanya mengisi data yang minima sahaja. Guru-guru sekolah saya tidak lagi menggunakan komputer dan mengambil masa yang lama untuk menyediakan pelbagai jenis laporan.
4. Innovasi ini sangat membantu guru-guru kepada kemenjadian murid. Sangat menjimatkan masa dan tenaga kerja. Inovasi ini mengurangkan 7 orang yang buat satu tugasan yang sama .
5. Innovasi ini sangat berpotensi untuk diperluaskan kepada sekolah-sekolah lain. Ini kerana kebanyakan sekolah mengghunakan banyak QR Kod utk menyelesaikan tugasan tertentu. Manaka projek ini hanya melibatkan satu QR Code sahaja.
6. Anugerah yang telah terima :
   a) Acedemic International Dialogue (AID) 2019, Bronze
   b) Sabak Bernam Innovation Competition 2020 (SABIC 2020), GOLD
   c) Citra Pendidik 2020, Gold

Rumusan

Kesimpulannya, Innovasi ini adalah sangat praktikal, senang, mudah, tanpa stress dan flesibilti kepada guru-guru kerana ia dapat membantu guru-guru menjimatkan masa dalam menyediakan laporan. Selain itu, ia juga dapat memberi motivasi kepadaguru-guru untuk menyediakan pelbagai laporan dengan cepat dan senang.

Penghargaan

Kami mengambil kesempatan disini untuk mengucapkan terima kasiih kepada seluruh warga SJKT SEPANG. semua warga SJKT SEPANG dengan rela hati dan gembira telah menerima transformasi sekolah dengan menggunakan innovasi ini.

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MyRISE AS A PIONEERING MODEL TO CATALYZE INTEGRATED RESEARCH EXCELLENCE FOR SCIENCE UNDERGRADUATE STUDENTS

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Highlights: High-impact undergraduate student learning ecosystems can be strengthened through the empowerment of student research experiences. Thus, the MyRISE (Research Intensive in Science Education) programme has been developed as a pilot model for student development based on the key research agenda. The main focus of MyRISE is to develop students' academic knowledge, soft skills and research skills, especially in the field of science in an integrated manner. MyRISE has three priority areas, namely research component in the curriculum, the implementation of early stage research projects and the enrichment of the research environment. Overall, MyRISE can meet the objective of transforming students' learning experiences that focus on cultivating research excellence at undergraduate level.

Key words: Undergraduate; Research; Curriculum, MyRISE

Introduction

Universities are responsible for developing students who have the knowledge, skills and values of life in a holistic and balanced manner. At the undergraduate level, programmes that impact students' learning experiences need to be designed systematically. Conventionally, students are exposed to the learning process of courses in the form of lectures and practical work.

However, the research component is also a learning practice that can have a positive impact on students at the undergraduate level (Kun, G.D., 2008). This is because the research process involves an inquiry process in the development of new knowledge that can improve students' academic knowledge. In addition, the research skills built are in line with the needs of soft skills development.

Studies have also shown that the involvement of students with moderate academic performance in research successfully highlighted their potential for excellence in new aspects, such as research publication and presentation (Alsuhaibani, et. Al., 2019). In addition, it was found that students with moderate previous academic performance were also able to obtain better grades in research projects compared to other course grades (Parker, J, 2018).

In addition to developing knowledge scholarship, research conducted in phases over a period of several years also improves the skills and attitudes required as a scientist (Thiry, H. et. Al., 2012). In fact, student involvement in authentic research in solving real problems also contributes to preparation for career development.

Thus, a structured and directed research development program is needed to transform the undergraduate learning ecosystem in a more integrated manner. To achieve this goal, the MyRISE (Research Intensive in Science Education) program has been designed as a pilot model and has been practiced at the Faculty of Science, Universiti Teknologi Malaysia. The three priority areas of MyRISE integrated focus involve the assimilation of research in the delivery of the

academic curriculum, the development of systematic research activities at the beginning of the study and the engineering of institutional ecosystems that cultivate research excellence.

Specifically, MyRISE is able to actively engage lecturers and students in the integration of the two major missions of the university in education and research. This is because the separation of activities between teaching and research has occurred following changes in the university model and the direction of higher education (Clark, B.R., 1997). In addition, MyRISE can cultivate the interest and research skills of undergraduate students which paves the way for them to continue their studies for postgraduate programmes.

Content

Universities need to provide a variety of opportunities for students to ensure that they encounter the process of learning experiences on campus inclusively and fully. In the aspirations of university education at the undergraduate level, the focus on the research component is usually limited due to the lack of focus and clear direction. Thus, MyRISE (Research Intensive in Science Education) is designed to ensure the benefits of research as a work-based learning platform obtained by students. In addition, the MyRISE program can foster the integration of student attributes in academic knowledge, soft skills and research skills. The MyRISE model is also capable of pioneering a research culture among students including lecturers as well as supporting the academic excellence and research performance of universities, especially research universities such as Universiti Teknologi Malaysia (UTM).

The first priority area of MyRISE is the integration of research components in the curriculum of academic programmes. Generally, academic programmes focus on theoretical and practical courses. To meet current needs, work-based learning processes and involving real problem solving need to be implemented such as through research components. Curriculum empowerment with research content also allows for inclusive access to all students.

Three research integration strategies in the curriculum are proposed. The first is to introduce courses in the form of undergraduate research projects. In the next step, some improvements are suggested. Among them, student research projects can be aligned to solve current problems and industry needs. For example, the undergraduate research project of the Department of Chemistry, Faculty of Science UTM has been implemented involving the solution of pollution problems in Sungai Kim-Kim, Pasir Gudang, Johor. Furthermore, there is also a need to increase the scientific communication capacity of students as a result of research findings through training and periodic activities. In addition, the research output at the undergraduate level can also be arranged so that it can be published at least in the form of proceedings as per the practice of the Faculty of Science UTM (Table 1).

Table 1: Number of proceeding published by undergraduate students at Faculty of Science Universiti Teknologi Malaysia (2017-2019).

Field	Number of Proceeding
Chemistry	84
Physics	46
Mathematics	199
Biology	18

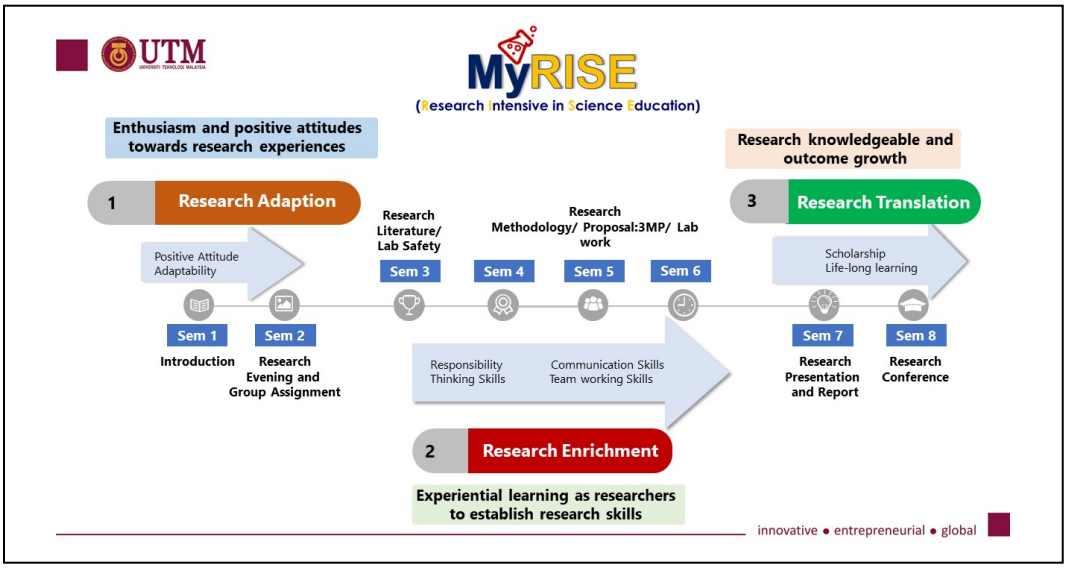
The second strategy is to empower the teaching-research nexus where the latest research findings are integrated with selected courses in undergraduate academic programmes. This initiative requires the expertise of lecturers in translating research reports into teaching modules. In addition, specific assignments can be given to students to extract research information appropriate to the needs of the course. The third strategy is to introduce research method courses for all undergraduate students as well as postgraduate students. What is different is that the essence of the course should start from the basic level including involving research motivation.

MyRISE's second priority area is to introduce structured research programmes starting from the beginning of undergraduate studies. Compared to the more inclusive first priority areas, this second part is more specific and participation is voluntarily. MyRISE has adapted several examples of overseas university programmes, including from the United States, United Kingdom, Singapore and Hong Kong, in ensuring the programme model becomes an international benchmark. Three different phases have been designed, namely research adaptation, research enrichment and research translation according to the student study semester (Figure 1). This gradual development of research enables students to build motivation as well as positive values in research experience, develop research skills and produce research output.

MyRISE's third priority area is the construction of an institutional ecosystem that stimulates a culture of research excellence. As is the practice at the postgraduate level, some activities, such as research workshops, seminars and conferences, which are commonly held, are also suitable for undergraduate students. However, the level of adaptation needs to be given attention by ensuring that the learning process is integrated with the course content. In this regard, the institution's commitment to the priorities of undergraduate research is essential to ensure the successful development of the research environment. Institutional management should provide plans, resources and recognition to ensure the sustainability of undergraduate research programmes (Rowlett, R.S., et. Al., 2012).

In conclusion, learning innovation needs to be adapted to meet new needs and challenges. Thus, the exploration of learning capacity through research components should be given priority. Through the integration of research in learning, students are also exposed to work-based learning processes. The MyRISE model proposes a comprehensive strategy taking into account the needs of the 21st century as well as new academic learning innovations through research components to develop student attributes across knowledge and soft skills.

Figure 1: Roadmap for Undergraduate Research Excellence



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Exploring of Students' Experiences of Learning in Synchronous Online Class using Discord Platform

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Highlights: The COVID-19 pandemic has disrupted all sectors worldwide, including education. In this situation, the conventional face-to-face method has been rendered unusable due to complying the new norm of social distancing. One of the most significant challenges moving to online classes is finding the most conducive platform that can cater to the online classroom and group discussion needs. In this study, the authors have tested online gamers chatting platform, known as Discord, with students from different cohorts and different academic year. The results have shown that Discord is the ultimate tool which may replace the use of popular platforms such as Zoom, Webex and Google Meet.

Keywords: Synchronous; Online-learning; Discord; Virtual platform

Introduction (Project or Innovation)

The increment of COVID-19 cases has forced the Malaysian government to impose Conditional Movement Control Order (CMCO). Due to this situation, online learning becomes compulsory for Electrical Engineering students at Universiti Teknologi Malaysia. Although many face-to-face classroom practices can be adopted for online classes, not all approach is suitable. As stated by Orlando and Attard (2015), "teaching with technology is not a one size fits all approach as it depends on the types of technology use at the time and also the curriculum content being taught". The technology is only a platform to the academic staffs in implementing the best pedagogy to deliver contents of the course. Therefore, one of the challenges among the academic staffs is to change from the use of the traditional teaching method to the e-learning method. According to Arkorful and Abaidoo (2015), e-Learning is to use of information and communication technologies to enable access to online learning/teaching recourses. They are three ways of using e-Learning which is adjunct, blended and online (Algahtani, 2011). Adjunct means e-Learning is an assistant in the traditional classroom where blended means delivery course content using both traditional and e-learning in the classroom setting. In this work, the third use e-learning is applicable, which is wholly online, no traditional learning participation. Therefore, the investigation of students' engagement is crucial since Algahtani (2011) and Zeitoun (2008) stated that the whole online class is maximum independence of the learners or students. There are four types of students' engagement which are; (1) Cognitive: Students learning the content of the course, (2) Behavioural: Students able to follow classroom rules, (3) Emotional: Students have interest and willingness to invest in the learning and engage with it and (4) Psychological: Students connects with the instructor and other students. Designing synchronous course activities is a big challenge for instructors. Some problems faced by the instructors in a synchronous online course are promoting students' participation, managing various communication channels, scheduling and using teaching tools (Do, 2018). In this work, synchronous course design strategies in Electrical Engineering Couse will be discussed.

Objectives

The objective of this study is to explore students' perception of the course design activities using Discord in synchronous teaching method. Research Questions:

1. What are the students' perceptions of the synchronous effect using Discord on communication and relationship formation?
2. What are the students' perceptions of the synchronous effect using Discord on knowledge development?

Implementation

In designing a synchronous online class, it needs to be driven by pedagogical practice. In this work, social constructivism is used. Lev Vygotsky developed social constructivism in 1978. He believed that learning is a collaborative process, and knowledge develops from individual interactions with their culture and society. Hence, engagement of students during the synchronous online class is significant. In order to achieve this goal, several

questions are; (1) What tools are available? (2) What are the features of the tools? (3) Which tool is the best in attainment the objective?

Table 1 listed the available tools and their features available. By referring to Table 1, the authors decided to use Discord for maximum engagement with the students. Figure 1 shows how the authors design the synchronous class using Discord and UTM e-Learning.

As can be seen in Figure 1, Discord can be used during the class session and after the class session. In other words, Discord can be used for the synchronous and asynchronous online class. This is because the group remains in the class server. During the class activities, students can use a text channel for chatting or voice channel for verbal communication. In the text channel, students can share file while in the voice channel, students can share their screen. Also, all group members can share their screen at the same time. Therefore, this feature can be used to ask the students to think first before share with their team members. In the aspect of the instructors' benefits, it is easier to monitor all the groups since it is on the same server. Instructors can quickly identify which group is sharing screen and explain to the other members. Besides, compared to the WhatsApp and Telegram, grouping in Discord is much better since instructors only have one server for one class and channels for each group.

Findings and Discussion

The students have given their feedback on the overall implementation of Synchronous Class via Discord. They rated their experiences into several categories, which are; (1) Satisfied: This includes the feeling of the excitement of the session, overall understanding, session organization and flow, and finally, the smoothness of the whole session, (2) Neutral: No comment by the students and (3) Unsatisfied: the opposite of satisfied. Figure 2 summarized the feedback and comments given by the students towards the overall implementation of Synchronous class with Discord. The percentage comparison was made based on a group of respondents from Year 1 students (for two different sections) and Year 4 students (for three different courses). The survey question was asking the student to give their overall comment on the implementation of a Synchronous Class through a Gamer's Platform, which is well-known by most students called Discord.

Table 1: Comparison of the available synchronous online platform.

Platforms	Features	Advantages	Disadvantages
Zoom	• Support audio and video sharing • Collaboration tools • Easy transitioning from group chat to one-to-one or group calls • Participants engagement tools like polling, virtual hand-raising and attention tracking	• Easy to learn and use	• The free version has a limitation • Do not support multiple concurrent desktop sharing
Discord	• Can create chat rooms called servers • Servers can relate to particular topics or interests • The server can be public or private • The server can be subdivided into channels • Support video call • Support audio and video sharing	• Free • Allows for much creativity • Secure • Multiple real-time screen sharing	• Focuses on gamers • Can see when others are logged into games • No recording • Limited file size
Webex	• Support audio and video sharing • Messaging and collaboration tools	• Secure • Easy to use • High quality	• Do not support multiple concurrent desktop sharing • Hard muting

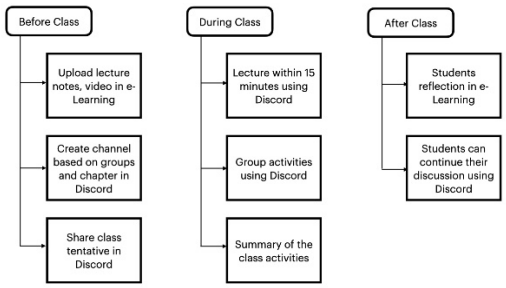

Figure 1: Synchronous online class design

As displayed in Figure 2, it shows that 2 of the group respondents from Year 1 SEEE1022 – section 08 and Year 4 SKEL4613 are 100% satisfied with the class implementation through Discord. Generally, students are well-satisfied with overall implementation, students were excited and feel enthusiastic in participating in the group discussion, students were also satisfied with the arrangement and flow of class in Discord, they felt smooth throughout the class session. About 94.12%, 83.33% and 86.67% of students from Year 1 SEEE1022 (section 07), Year 4 SKET4623 and SKET3623, respectively, are also feel satisfied with the overall implementation.

Meanwhile, another 5.88% of students from Year 1 SEEE1012 (section 07) and 16.67% of students from Year 4 SKET4623 are neutral and have no comment about it. Finally, only 13.33% of students from Year 4 SKET3623 are unsatisfied with the overall implementation, and all their comments are due to the poor internet connection during the class session. It can be concluded that the majority of students are satisfied with the overall implementation of the synchronous class by using Discord platform. Although Discord is already well-known among students for Gaming activity, surprisingly it gives a significant impact in Teaching and Learning where most of the students were well-satisfied with the overall class session through Discord Platform.

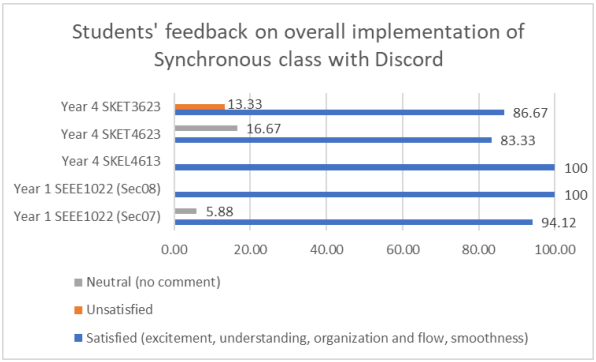

Figure 2: Students' feedback on the overall implementation of Synchronous class with Discord Platform (Percentage comparison between Year 1 and Year 4 students).

In the class session, students were divided into a small group to discuss their understanding of the lecture/study material. Discord provides a very user-friendly, interactive, and intelligent Gamer's platform which can be adapted for Teaching and Learning. In Discord Platform, the instructor basically can create several numbers of the group, which consist of 4 to 5 students in each group. In Discord, roles can be assigned to each student. Then, the students can be divided based on their roles into a specific group through the Text and Voice Channels. In these channels, the students can discuss by typing, talking or sharing their screen. Each group is isolated; hence the students can voice out their ideas without disturbing other groups within the same platform. Students were given about 20 to 25 minutes to discuss among their group member on what they have understood throughout the given lecture and summarize their understanding on Jamboard Platform. The percentage of student's perception of Discord Platform are tabulated in Figure 3. Their perceptions were classified into three categories which are "Interesting", "Not interesting" and "Neutral". As shown in Figure 3, the majority of students from all the group of respondents think that Discord Platform is an exciting platform to be used as Teaching and Learning. The classification of interesting from their perspectives includes Interactive, User-friendly, enjoyable, practical functionality, helpful and the effectiveness of the Discord Platform for group discussion among students. More than 90% of students of Year 4 SKEL4613 and Year 1 – SEEE1022 (Section 08) agreed that Discord Platform is impressive. 88.24% students of Year 1 SEEE1022 (Section 07), 75% students of Year 4 (SKET4623) and 80% students of Year 4 (SKET3623) are also approved that the platform is engaging. There are few of them which about 25% students of Year 4 (SKET4623) and 20% students of Year 4 (SKET3623) thought that Discord platform is not attractive, this probably due to the issue of poor internet connection at their place. In contrast, the remaining number of students are neutral about the platform; their reasons are that the platform is still new to them; they need more time to explore and get used to it. Generally, students had fun throughout the session and gave positive feedback on the effectiveness of Discord as a Teaching and Learning platform. Some of the comments also suggested using Discord platform for the whole semester, which they found out very easy and practical to use. On top of that, the user interface (UX Design) of Discord platform is beautiful and pleasurable for the youth. They even make comparison with other platforms such as Zoom, Whatsapp and Webex, and approved that Discord is the best for group discussion activity. In contrast, for those who perform in standard group discussion through other platforms might only text among them. It can be concluded that by adopting the usage of new Gaming technology like Discord can give a better impact on students' learning experience.

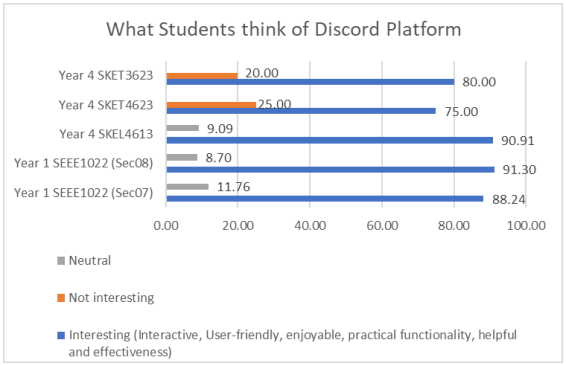

Figure 3: Students' perception of Discord Platform (Percentage comparison between Year 1 and Year 4 students).

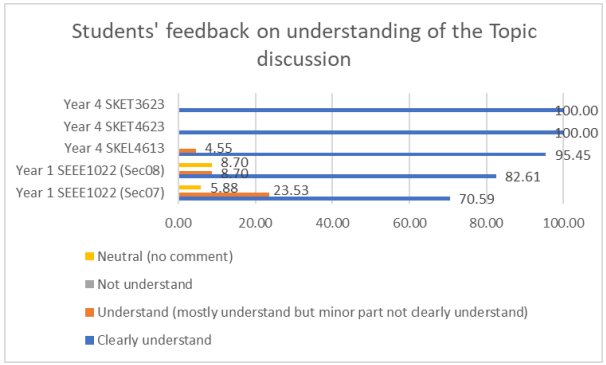

Figure 4: Students' feedback on the understanding of the Topic discussion (Percentage comparison between Year 1 and Year 4 students).

Figure 4 indicates the students' feedback on the understanding of the topic discussion through Discord platform for both Year 1 and Year 4 students. All students have been assigned with a task which must be completed in a group. Every group must discuss the topic given and summarize it in Jamboard so that everyone, including the lecturer, can look at it and can monitor their progress. From the lecturer's observation, all groups have done an excellent job in delivering their understanding, and it shows that they have clearly understood what has been taught. Also, they have a good outcome from their group discussion through Discord platform. Although this is an online discussion, they genuinely have no barrier by using an effective platform like Discord which provides practical functionality for Teaching and Learning. The observation is supported by the survey, as shown in Figure 4. 100% students from Year 4 (SKET4623 and SKET 3623) clearly understand on the topic given. More than 90% of the students agreed that they

understand on the topic given. From the chart, we can see that majority of the students clearly understood what has been taught and discussed in the group. Followed by a few of them with uncertainties on the topic that has been discussed, which means they still need to revise again on some minor part to understand clearly. Subsequently, only a small number of students about 1 or 2 students in each class are neutral and has no comment about it. Remarkably, the given lecture and the group discussion through Discord platform gives a significant impact on students' performance and understanding.

Conclusion

In a nutshell, Discord, which has been an all-time popular platform for communication in the gaming industry, is also a suitable tool that can be leveraged as a tool for online classes and discussion. From the majority feedback of year one to year four students on their experience using Discord, it was evident that Discord is suitable and sufficient for any courses and promotes effective communication and team working. Thus, it can be concluded that Discord is and undeniably one of the most effective tools for online classroom and discussion.

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Virtual Mental-Health & Psychosocial-Supports (MHPSS) Platform For Students' Psychological Wellbeing During The Pandemic

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Highlights: Students are a social category that has been hit by coronavirus pandemic, which would be expected to further exacerbate academic stressors. This project suggests sharing virtual mental-health and psychosocial-supports (MHPSS) platform that provides services for students. This is an innovative approach; the applicability of the project is in the "super-support" provided; students can easily contact qualified mental-health professionals from different universities and without the hassle of commuting to professional's office. A fifty-minute of virtual MHPSS session will be given for students to overcome academic stressors. This project adds values to Sustainable Development Goals (SDG) to enhance health, education, and policy-related.

Key words: Mental-Health; Psychosocial-Supports; Students' stressors; Psychological wellbeing; Sustainable Development Goals (SDG)

Introduction

Although the world has made a progress in some of the targets of SDGs, under the seventeen (17) Sustainable Development Goals (SDGs), yet people are still going through various epic crises that occur one after another. And today, the world is living in light of the data of the emerging corona disease (COVID-19), which is considered the most significant crisis, the dire and the problematic situation, the suspicious reality, and the unenviable matter. Thus, people live in this crisis on all its details, coexist with its circumstances, and suffer from its effects and influences on their lives. As a result, the COVID-19 Pandemic is affecting societies' progress on these 17 goals; as good health (SDG 3), education (SDG 4), Take urgent action to combat climate change and its impacts (SDG 13). Undeniably, many governments and organizations claim to be tackling issues related to a disaster, yet COVID-19 was significant stress for everyone.

Quarantine has changed the lives of almost every person; many families lost their jobs and, therefore, stable income. Some people were left alone in a foreign city or country, unable to return home. People whose lives are connected with movement, sports, and communication have practically lost the meaning of life (Newhall, 2020). Another problem is that the coronavirus is directly affecting the education system. As we know, in schools and universities, all deadlines are set a year in advance. Students cannot sort out their subjects. Universities have changed the dates of tests and exams, and all studies have been transferred online. This causes lots of stress for teachers, students and even families. According to Wickens (2011), it is reasonable to venture that students may experience reduced motivation toward studies, increased pressures to learn independently, abandonment of daily routines, and potentially higher rates of dropout as direct consequences of these measures. Thus, by increasing academic stressors in a population with heightened pre-existing stress levels and a potentially reduced ability to rely on typical coping strategies, such as family who themselves may be experiencing heightened distress, the COVID-19 pandemic has placed an unprecedented mental health burden on students, which urgently requires further examination and immediate intervention.

The World Health Organization on April 22, 2020 warned that the coronavirus crisis would not end soon, with many countries; it's only in the early stages of the fight, as the global death toll surpassed 180,000. Moreover, this crisis will not be the last; many more are coming, and so what could be done differently to make sure we are better prepared for such crises in the future? Preventing pandemic on mental health and planning a quick solution remains a significant concern for international politics. What exactly characterizes societies, and what are their chances to avoid disaster? What does this mean for students' well-being efforts, and what types of support students need? This project suggests an innovative method as a virtual Mental-Health And Psychosocial-Support (MHPSS) to build community resilience to the pandemic in general and students wellbeing in particular; its a system providing "psychological first aid, emergency response, guidance, and mental support," that connect mental health professionals online with those affected and known to have depression, and anxiety. This is an innovative method in helping students contact mental health professionals; the innovative solution, which will fill up the gap for lack of access to mental health and psychosocial support services when movement is controlled. However, the challenges are the security of the

information in the system, and the policies that address the use of virtual mental health and psychosocial support system.

Content (Project or Innovation)

1. Project or innovation objectives

The study objectives are:

1. To design a virtual mental health and psychosocial support (MHPSS) platform that can be used by students
2. To develop a confidential data in the virtual mental health and psychosocial support (MHPSS) system
3. To promote the acceptance of the virtual mental health and psychosocial support (MHPSS) system
4. To train the mental health professionals on how to use the virtual MHPSS system
5. To propose policies that enhance the use of virtual mental health and psychosocial support (MHPSS) system

2. Issues To Be Addressed

In achieving the objectives of the project, the following issues shall be addressed;-

1. Is it suitable to design a virtual mental health and psychosocial support (MHPSS) platform that can be used by students?
2. Is the data in virtual mental health and psychosocial support (MHPSS) system confidential?
3. Can students accept the virtual mental health and psychosocial support (MHPSS) system?
4. Can mental health professionals be trained to use the virtual MHPSS system?
5. Are the propose policies enhance the use of virtual mental health and psychosocial support (MHPSS) system?

Workflow

The Flowchart of the Proposed Program is in the diagram (1) on the following page:

3. Novelty, Creativity, Innovativeness, Applicability And Impact

This project proposed an innovative method in helping students overcome their stressors through sharing virtual mental health and psychosocial support platform that can be established in the university system. Online mental health and psychosocial support is a wonderful tool for students in many situations; when movement is controlled, when access to healthcare is difficult, when online teaching and learning are stressful, when the COVID-19 Pandemic is not the last, and when people need assistance and have no one to talk. The pandemic situation today obliging everyone to look for quick psychosocial support, indeed, it is also forcing most traditional psychotherapists to adapt their practice to online counseling and psychotherapy. Therefore, this project is proposing an innovative sharing mental health and psychosocial support platform within the universities, so that the university can leverage on a creative mind to help students overcome their stressors. Moreover, the need for a virtual mental health and psychosocial support system is somewhat more demanding. Therefore, the novelty of this project is calling for a platform call "Super-Support", enabling access and effective use of technology, and finally creating a healthy environment for students to learn.

4. Research Methodology

The application of virtual mental health and psychosocial support for students is an innovative method; ICT for mental health services has been recognized as one of the effective approaches. The secure and safe certified platforms would be built in different university systems; a technical team will always be available to abide by strict technical and ethical codes of confidentiality of client and therapist both. The platform should support, computer vision, and voice, so the mental health professionals can focus fully on counseling, psychotherapy, and psychosocial support, The mental health professionals for quick response will receive a message, and a fifty-minute virtual mental health and psychosocial support session will be given for the students. Indeed, further social, organizational, and technical aspects need to be considered for successful virtual mental health and psychosocial support applications.

5. Expected Finding and discussion of the project or innovation

Creativity is in the outcome of this project; it will really be a benefit for students as well as university policymakers. It will provide a virtual mental health and psychosocial support program and a platform for students; policymakers can use this evidence to better understand where the gaps may be greatest and what needs to be done to ameliorate students' quality of life. The virtual mental health and psychosocial support system for students is somehow more demanding. It will help students easily contact the counselor, and then overcome their stressors related to academic. Moreover, the key outputs and outcomes of this project are to design and developed a virtual mental health and psychosocial support website that will help students' overcome their stressors. In addition, awareness will be given to students at different universities to accept the promotion of virtual mental health and psychosocial support system, so that the proposed platform and system can alleviate students' quality of life, mental health, and psychological wellbeing.

Acknowledgement

We would like to express our special thanks to the Universiti Teknologi Malaysia (UTM) and the Universiti Kebangsaan Malaysia (UKM) that have provided us with this golden opportunity to participate in NALI 2020. Our sincere thanks our colleagues who have kindly provided us with valuable comments for this project.

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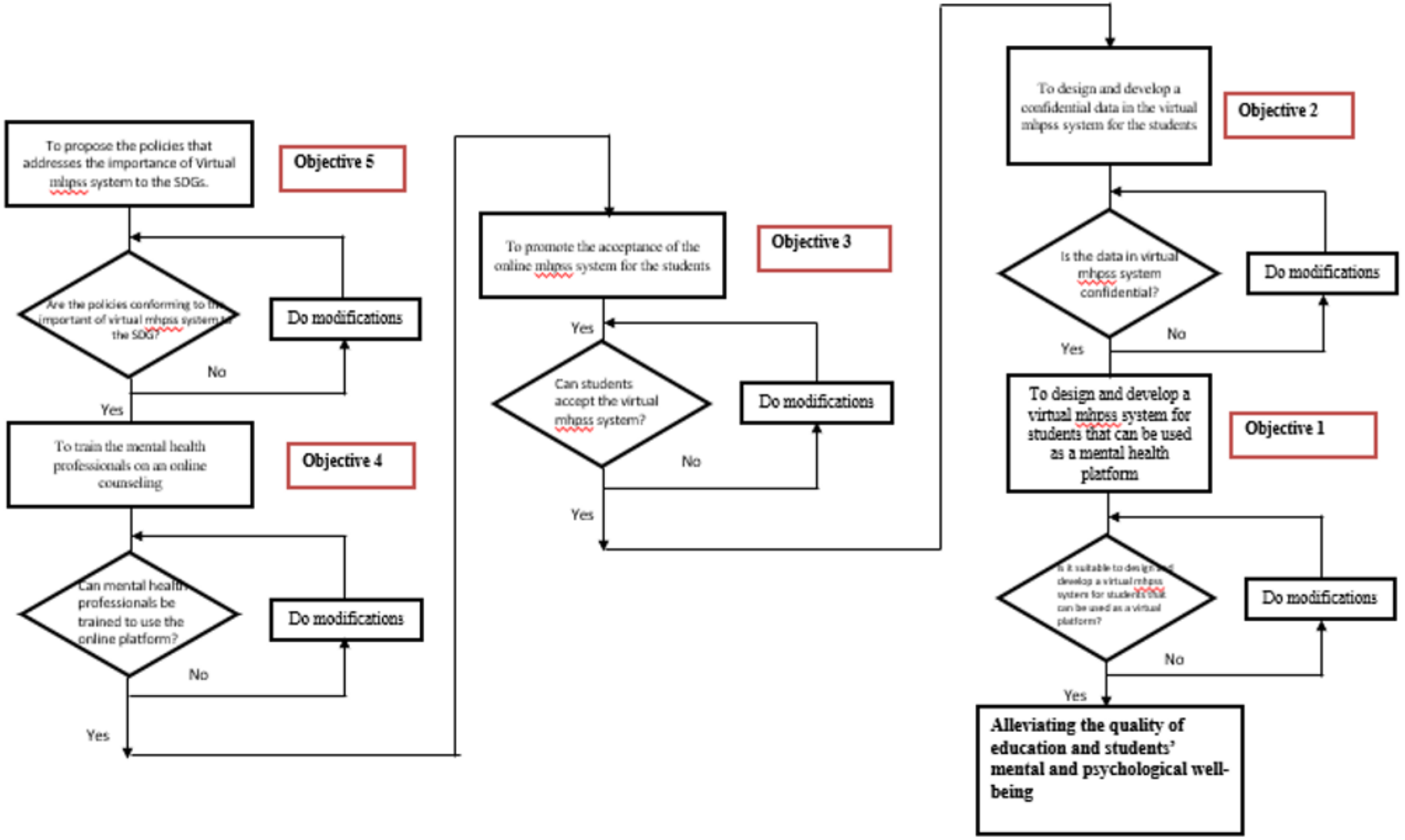
To propose the policies that addresses the importance of Virtual mhpss system to the SDGs.
Objective 5
Are the policies conforming to the important of virtual mhpss system to the SDG?
Do modifications
No
Yes
To train the mental health professionals on an online counseling
Objective 4
Can mental health professionals be trained to use the online platform?
Do modifications
No
Yes
To promote the acceptance of the online mhpss system for the students
Objective 3
Yes
Can students accept the virtual mhpss system?
Do modifications
No
Yes
To design and develop a confidential data in the virtual mhpss system for the students
Objective 2
Is the data in virtual mhpss system confidential?
Do modifications
No
Yes
To design and develop a virtual mhpss system for students that can be used as a mental health platform
Objective 1
Do modifications
No
Yes
Alleviating the quality of education and students' mental and psychological well-being

Engaging Students with Effective Learning Through Inverse Teaching Method for System Modeling and Analysis Course

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Highlights: Engaging students in learning activities for any courses that involve fundamental knowledge becomes more challenging. One of the related subjects is System modelling and analysis course. It is a compulsory course for electrical engineering undergraduate program in Faculty of Enginnering, Universiti Teknologi Malaysia that apply the fundamental knowledge of science and mathematics. Hence, a new effective inverse teaching method for learning process has been implemented in chapter 1 in this course, that is an introduction to control system. The results show that the students engagement increase up-to 90% and the positive feedback from the students describe that they agreed with the learning method.

Key words: Active learning; Online-learning; Inverse learning and teaching;

Introduction

In conventional learning, students acquire knowledge in a classroom, the teacher explains a topic and then followed by homework that includes student exercises after the class. However, COVID-19 pandemic has resulted in schools and collages shut all across the world where the students are out of the physical classrooms. As a result, education has changed dramatically, with the distinctive rise of online learning, whereby teaching is undertaken remotely and on digital platforms.

The sudden shift from the classroom to online learning, some are wondering whether the effectiveness of online learning and how such a shift would impact the quality of education. For the shift to online education has meant rethinking lesson plans to fit a very different format. Therefore, a new strategy should be implemented that help students to adapt the situation (Zeng et al. 2017). The most important thing is to achieve the objective of the learning outcome for that subject matter. Revers leaning is one of the alternative approaches (Bang et al., 2016) of active leaning method. Fariba and Azad (2020) have discussed the impact of using the reverse learning approach on educational goals and lifelong learning. In this work a inverse learning and teaching method has been implemented in System Modeling and Analysis course.

Project Innovation

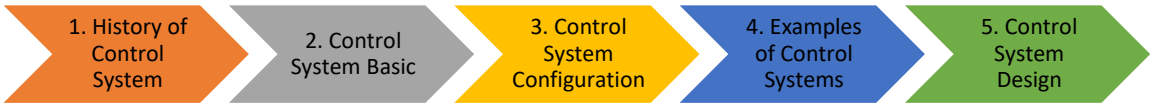
System Modeling and Simulation course is compulsory subject for undergraduate students, School of Electrical Engineering, Universiti Teknologi Malaysia. This work only focuses on Chapter 1 of this syllabus. This chapter describes the fundamental knowledge of the control system engineering. Generally, the conventional teaching approach for this chapter is presented as in Figure 1(a). The students are taught the basic principle of control system and control system design processes sequently from topics 1 until 5.

In order to make sure the students engage during online learning, new inverse teaching and learning technique is implemented as shown in Figure 1(b). They must be ready with pen and piece of paper, sketch and write down the ideas and information needed, which are guided along the learning process. The synchronous lecture with Webex as online platform and Padlet for an activity submission. Only 2 platforms used for these activities in order to make sure

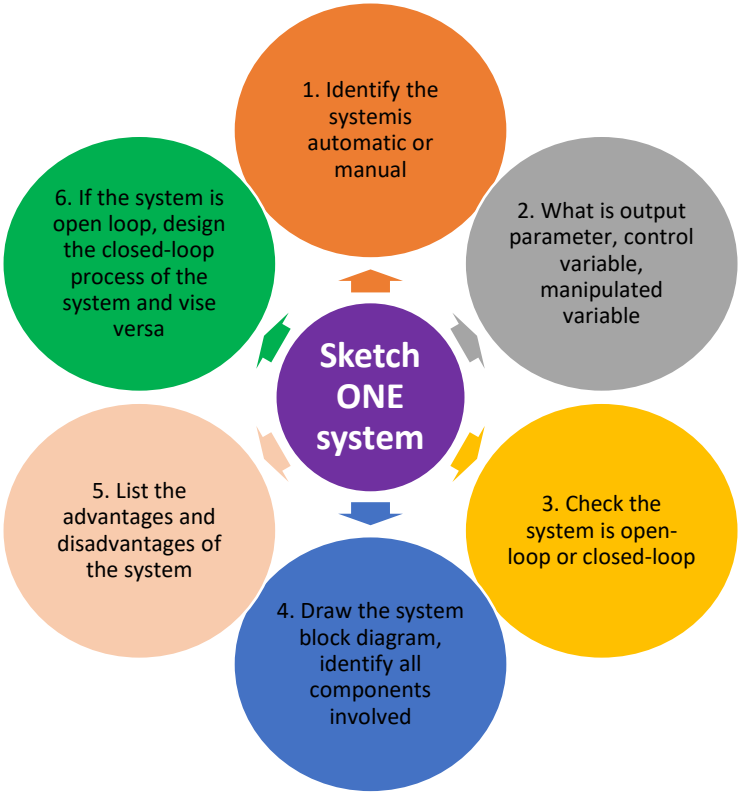
the students not lost of focus during learning process. Now more than fifty students are engaging during the lecture with the course contents.

The lesson is started with the first activity, which is to sketch one example of control system around them and submit through Padlet. The percentage of student involvement is tabulated in Table 1. The second activity is to answer the question 1, which to identify their chosen system whether automatic control system or manual control system. The students will be guided by the lecturer that gives some the explanation on how to identify these types of system. After that the lesson move to question 2 and until question 6, where for every question, some explanation and examples are given in detail including the basic theory and principle.

Students engagement and reflection are presented in Table 1 and Figure 2 for the inverse learning and teaching activities. The results show that almost 90% of students happy with the teaching and learning.



(a) Conventional teaching and learning



(b) Inverse activities online teaching and learning

Figure 1. (a) Conventional and (b) Inverse Online Teaching and Learning

Table 1. Participation of Students in Activities

Items	Activities	% of Participation
1	Sketch system diagram	83%
2	Discussion on proposed system	Randomly selected
3	Complete system presentation	90%

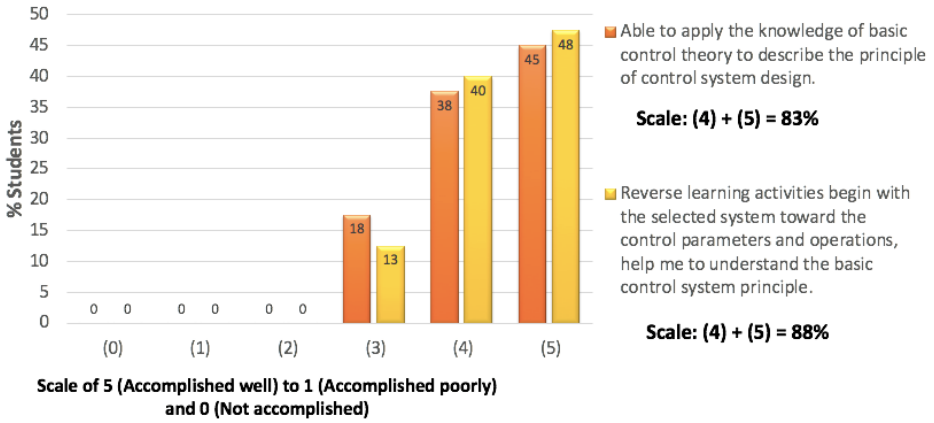


Figure 2 Students reflection

Conclusion

This paper has presented the implementation of inverse teaching method with an online learning activities for System Modeling and Analysis course. This method is proposed to enhance the students engagement during online learning and involve in all the activities. The results of participation show that, the majority of students actively participated in all activities and willing to share their ideas with others. We found the positive reflections that show the students agreed with the proposed method.

Acknowledgement

We are grateful to acknowledge the Ministry of Higher Education (MOHE), Malaysia and University Teknologi Malaysia (UTM) for the financial support under the University Grant project number Q.J130000.3851.19J19 for teaching and learning activities.

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Physics and Human Body Systems as Integrated Course

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Highlights: Most of medical and health academic programmes consist physics as a basic and preliminary course required for other technical and clinical courses. It will be intersted for healthcare students if physics course being taught in the way that they can fully utilize and link the given knowledge to the next relevant courses in their programme structure. Healthcare education is a dynamics process of learning required unveiling the hiding knowledge in physics and focusing more on relevant topics that applicable in diagnosis and treatment clinical procedures.

Key words: Course; Education; Healthcare; Knowledge; Integrated

Introduction

Developing integrated courses may face difficulties and time consuming to be introduced and then be implemented. Teaching physics course to healthcare student may have some challenges because of the possibility of irrelevancy certain physics topics to their profession. In order to overcome this challenge, it is possible to introduce a creative integrated physics course that can relate some of its topics to other topics in healthcare courses. Providing clinical knowledge and skill for each topic in physics course may enhance the understanding of its principles that will be more applicable and relevant to healthcare academic programmes (Heidi et al., 2016; Seitz, 2012). The main objective of this study to introduce an integrated physics course for medical and allied health programmes. This course may assist improving the learning outcomes of healthcare student and allow them to be more confidence and efficient dealing with patient in clinical practice.

Methodology

Sometimes it is possible to explain and relate any physics topic to health facts through different academic activities in formative assessments in order to have deep understanding about it. There are many physics principles can be described more to understand the function of human body systems. It will be more interested for healthcare students if they can relate each topic in physics to human body systems that are basically required for many clinical courses of healthcare programmes. Most of physics topic uses a graph as a teaching tool to explain about certain physical quantity. It can be used to understand the facts and concepts in any course. There is no doubt that students may enhance their understanding through graph analysis. Graph analysis is a knowledge base approach need for healthcare sector that provides an ideal technical means (Yong et al., 2020). It is most useful if a proposed teaching process being modified using this tool to enhance knowledge and skill. The clinical knowledge of healthcare students can be improved by describing the graph in a scientific way based on physics principles and then applying the experimental data on human body as a tool to diagnose any abnormalities of body function for defined activities.

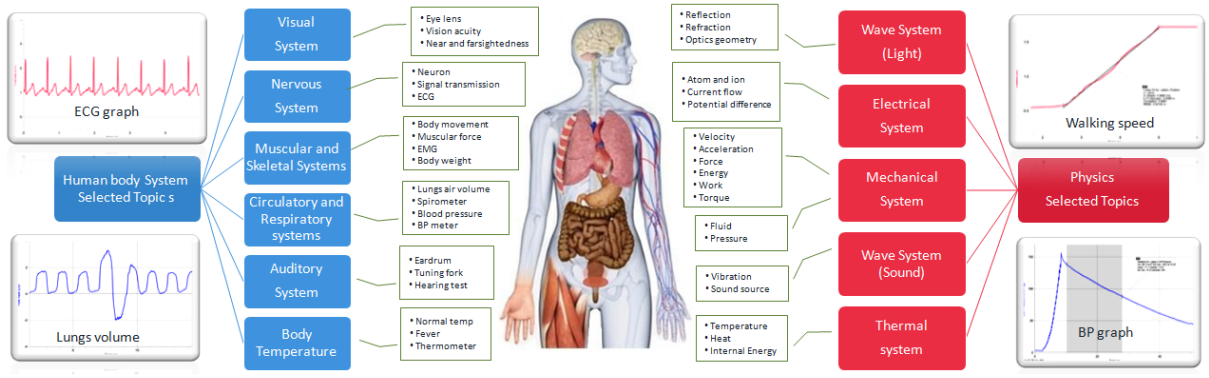

Figure 1: Using graph as teaching tool in integrated course

Finding and Discussion

There is a possibility to merge physics course to other courses in healthcare academic programme. An integrated of physics principles to healthcare topics needs understanding its level of relevancy and can be done through experimental learning (Suneeta, 2020). For example, to determine the human walking speed it is necessary to understand the physical quantities of speed under mechanical system in physics. This physical quantity can be used to determine human walking speed using motion detector as shown in right upper graph of Figure 1. Then, there is a possibility to compare the determined value of walking speed to patient walking speed having abnormalities in spinal canal such as lumbar spinal stenosis (Michael et al., 2019). Healthcare student should know the way to determine the walking speed from a graph for diagnosis purposes that may give them information regarding any possible abnormalities patient may have. Another example of using graph for analysis is blood pressure (BP) measuring graph as illustrated in right lower graph of Figure 1. The BP graph may show the beginning time of systolic pulse and the ending time of diastolic pulse that allow student to understand the mechanism of fluid pressure in physics. There is also electrocardiograph (ECG) and lungs volume graphs presented in Figure 1 that can be used to relate them to other physics principles. Table 1 consist different topics in physics that have possibility to be integrated with other topics in healthcare courses. Each topic may need the use of testing tools such as, motion detector, Bp meter, spirometer, ECG sensor, eye chart, temperature sensor, tuning fork, and other tools. This proposed integrated physics course may needs special task force to come out with the ideal physics course contain that applicable to healthcare academic programmes in secondary schools and universities.

Table 1: Integrated course of physics and human body systems.

Integrated topic	Physics topic	Human system topic	Subtopics	
			Physics	Human system
Light and visual system	Wave system (Light)	Visual system	• Reflection • Refraction • Optics geometry	• Eye lens • Vision acuity • Near and farsightedness
Electrical and nervous system	Electrical System	Nervous System	• Atom and ion • Current flow • Potential diff.	• Neuron • Signal transmission • ECG
Mechanical and musculoskeletal system	Mechanical system	Musculoskeletal system	• Velocity • Acceleration • Force • Energy • Work • Torque	• Body movement • Muscular force • EMG • Limbs motion
Mechanical, circulatory, and respiratory system	Mechanical system	Circulatory and Respiratory systems	• Fluid • Pressure	• Lungs air volume • Blood pressure • BP meter
Sound and auditory system	Wave System (Sound)	Auditory System	• Vibration • Sound source	• Eardrum • Tuning fork • Hearing test
Thermal and body temperature system	Thermal system	Body Temperature	• Temperature • Heat • Internal Energy	• Normal temp • Fever • Thermometer

Awards Received

S/N	Award	Title of project	Exhibition	Year
1	Silver Medal	Disease Prevention and Health Promotion: Test workplace for Radon	Selangor Innovation & Creativity Exposition (SLICE '18), Shah Alam	2018
2	Bronze Medal	Practical Simple Method of Avoiding Radon Accumulation for Health Promotion	ASIA International Innovation Exhibition (AIINEx) 2020, Johor	2020

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Comparative Health Effect of Radon and COVID-19

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Highlights: The mechanism of health effect caused by radon and covid-19 have few similarities that may require to compare and manage both of them. It should understand that avoiding radon exposure during COVID-19 pandemic represents a preventive step in healthcare management system to control their possible double health effect to human lungs. This comparison study may provide the basic understanding to avoid a place with high radon concentration during covid-19 outbreak. The similarities in health effect caused by radon and covid-19 may require some planning strategy and apply prevention rules for a situation whenever both of them being out of control.

Key words: Hazard, Health Effect, Human Lungs; Protection; Radon

Introduction

There are many studies around the world including Malaysia and Saudi Arabia reported radon concentration level exceeded healthy level of 100 Bq/m^3 in some locations. In Malaysia, the indoor radon level was estimated to be in the range of 0.30 pCi/l to 3075 Bq/m^3 (Nisar et al., 2017) whereas its level in Saudi Arabia within the range of 11 to 137 Bq/m^3 (Abdulrahman et al., 2019). Covid-19 is a newly discovered virus start spread all over the world in early year of 2020. Both radon and covid-19 are environmental causing diseases affects human lungs required some controlling and prevention actions. The objective of the study is to identify the several similar factors that affect human health caused by these two types of different hazards and find solutions to control and prevent their health effect.

Methodology

The naturally existence of radon in air may cause more health hazard during COVID-19 pandemic. Radon and covid-19 are two different types of hazards that have direct harm and effect to human lungs. The most effective way is to control these hazards by identifying and comparing their different characteristics and natural behaviors. There are many similarities and dissimilarities as illustrated in Figure 1 that allow doing a comparison between them.

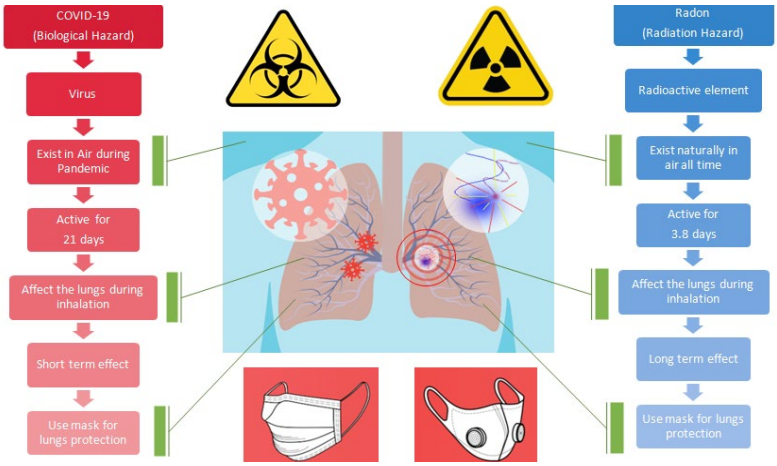

Figure 1: Similarities and dissimilarities of radon and covid-19

It is possible to differentiate between them based on their nature of existence, active lifespan (Manvendra et al., 2020; Xuan et al. 2020), human health effect, short or long term effect, and personal protection device. It is possible through this comparison process to identify each factor and their level of health effect as high or low status. The comparison results may improve the risk management system in decision making for prevention.

Finding and Discussion

There are few comparison factors as listed in Table 1 that represent health effect caused by radon and covid-19. The comparison results show some similarities and dissimilarities factors and their level of health effect. For similarity factors, both radon and cocid-19 exist in air, affect human lungs, and require wearing a mask for protection. Only wearing special mask can minimize their health effect (Jiao et al., 2020; Sun et al., 2020) and other factors have high risk of health effect. All dissimilarities factors for radon and covid-19 except for hazard type have high level of health effect which include lifespan and term effect. Based on the finding results, there are many joint factors that have high level of health effect caused by radon and covid-19 that require finding a solution to avoid their hazard specially when there is a high record of radon concentration level during covid-19 pandemic. There are a possibility of other unknown factors need to be consider for comparison in the future that are not listed in this study.

Table 1: Health effect level caused by radon and covid-19.

Comparison factor	Radon	Covid-19	Health Effect Level	
			Low	High
Similarities				
Air existence	All time	During pandemic	✗	✓
Health effect	Lungs cancer	Lungs pneumonia	✗	✓
Wearing mask	Particulate mask	Medical mask	✓	✗
Dissimilarities				
Hazard type	Radiation hazard	Biological hazard	-	-
Term effect	Long	Short	✗	✓
Lifespan	3.8 days	Up to 21 days	✗	✓

Award received

S/N	Award	Title of project	Exhibition	Year
1	Silver Medal	Disease Prevention and Health Promotion: Test workplace for Radon	Selangor Innovation & Creativity Exposition (SLICE '18), Shah Alam	2018
2	Bronze Medal	Practical Simple Method of Avoiding Radon Accumulation for Health Promotion	ASIA International Innovation Exhibition (AIINEx) 2020, Johor	2020

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The Effectiveness of ChemFor and PerTab Study Kit on students' basic concept of Chemistry among Form Four students in SMK Bukit Garam II, Kinabatangan, Sabah

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Highlights: This research was conducted to testify the effectiveness of ChemFor and PerTab study kit on student's level on basic Chemistry concept among Form 4 students in SMK Bukit Garam II, Kinabatangan Sabah. The study involved a sample of 6 male and 6 female students aged 16 years old. Descriptive statistics were used to analyze the level of understanding of basic concept among students. The descriptive statistical results indicated that the science process skills for students were at a moderate level. The independent t-test result revealed that there was no significant difference between male and female students' basic concept although they got better scores compared to male students with a p-value (0.684) that was more than 0.05 (p> 0.05). As a conclusion, the effectiveness of ChemFor and PerTab study kit among students was at a satisfying level. This indicates the need for more attention being paid towards the inquiry based science education (IBSE) activities to nourish students' acquisition on the basic Chemistry concept in the future.

Key words: ChemFor and PerTab Study Kit ;concept; students

Introduction

Students feel confused when they want to balance chemical equations. They tend to balance the equation based on the equation as a whole whereas they should use the oxidation number for each atom in the equation separately. Moreover, students argue that their failure in mastering the topic of electrochemistry is due to poor basic knowledge in chemical topics such as writing chemical symbols, writing ion symbols with the correct oxidation number (Mohd Noor Bakar,2010). The results of the study show that students are more likely to identify the ions that exist in compounds in the form of molten than compounds in the form of solutions. Besides that, mastering knowledge at the level of memory and understanding is not enough to be the main condition in producing a complete essay.Students cannot memorize the Periodic Table of Elements by Group and Period. Compared to physics and biology subjects, chemistry subjects are the most widely used technical language (Dimopoulos, Koulaidis & Sklaveniti,2005). Students also still can not master the ion formula for elements and compounds.

Objectives

This innovation aimed to help students to understand how to construct chemical equations in a balanced way. And then, it aid to lower the time taken for learning and teaching session. Last but not least, it is also helps to assist students to master the elements in the Periodic Table of Elements by Group and Period.

Novelty

According to the author's knowledge, no comprehensive work was dedicated to build teaching Aids made by Science teachers while teaching topic 3 : Chemical Formula and Equation under Chemistry Form 4 KBSM/KSSM subject more effectively. As far as the authors are aware, there is no published analysis of the factors affecting the effectiveness of teaching aids using the inquiry - collaborative method. Indeed, at present, general research in teaching aids for this topics is still in its infancy.

Creativity

The study kit consist of a set of ChemFor (three activities : Configure it, Crossing over and Balance it) as well as one set of Periodic Table (Periodic table Fan). A multiple colourful set of study kit that attract students attention. First, a kit for the first activity: "Configure it!" which includes questions and answer schemes on the back of the styrofoam board. Second feature is a kit for the second activity that is "Crossing over" which includes questions - forming compound questions that is using the technique of intersection between two elements in the form of ions. Schemes are also available at the back of the styrofoam board. And last one, a kit for the third activity, "Balance it" which includes questions related to balancing chemical equations and answer schemes can be found at the back of the styrofoam board.

Innovativeness

This learning kit is developed based on the latest Chemistry syllabus documents (can be used on the KBSM and KSSM syllabus). Since there is not kit that ever been developed for this chapter on any research, hence, researchers made an invention that aimed to answer all of the conclusion and findings of the previous studies made by Mohd Noor Bakar (2010). The improved version of research in which it aimed to find out the most suitable approach that can be used by teachers in order to increase student's understanding and concept on this topics.

Methodology

A quantitative approach involving surveys was implemented in the study. A quantitative approach is an investigation that emphasizes investigation that is to be interpreted through data analysis (Chua, 2006). It can view the students' overall basic Chemistry concept in a particularly systematic and clear way carried out by the researcher. Prior to that, a survey research design was chosen as the study aimed to testify the effectiveness of ChemFor and PerTab study kit on Form 4 students in SMK Bukit Garam II, Kinabatangan, Sabah.

Participants

This study was carried out to 12 numbers (6 boys and 6 girls) of Form 4 students taking Chemistry subject in Sekolah Menengah Kebangsaan Bukit Garam II, Kinabatangan, Sabah.

Finding and discussion of the project or innovation

Table 1 : Female and male students' mean score in terms of basic Chemistry concept

Gender	N	*M*	*SD*	*t*	significant
Boys	6	47.28	16.54	.399	.684
Girls	6	49.89	15.64		

*Note : M = mean, SD = standard deviation, significant level, p = 0.05

Commercialization

It has a commercial value and can be sold to teachers and students in Malaysia or even overseas. It is cheap, easy to use as well as light weighted that even teachers and students are able to carry it everywhere.

Awards

This innovation had won a gold medal (first place) during teachers innovation competition (via online) in Kinabatangan district level as well as fifth place for the best teachers' innovation during competition (via online) for East Coast Sabah division level on 2020.

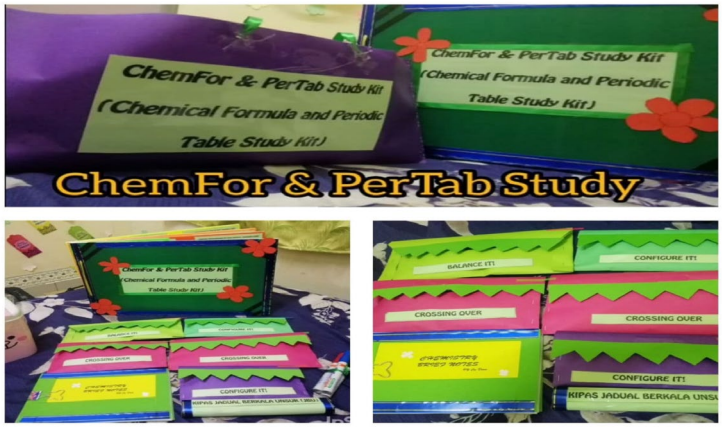

Figure 1 : Print Screen Project for Chemical Formula (ChemFor) and Periodic Table (PerTab) study kit

Acknowledgement

I am so grateful to my mom and dad, family members, my workmate as well as my close friends for giving me a support on going through this action research.

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Community Service Module for Bangsa Johor Bahagia (BJB): The Restoration of Knowledge Towards Learning Innovation

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Highlights: This project was inspired by the Sultan of Johor Sultan Ibrahim and Permaisuri Johor Raja Zarith Sofiah and aimed to provide an inclusive module of community service for the Bangsa Johor Bahagia (BJB) program. It was hoped that through this project, the life of flats community in Johor will be improved. In order to achieved this, Dasar Komuniti Negara (DKN) was used as a guideline to design the module where 13 activities have been devised for the module in Phase 1 and mapped with 5 out 8 clusters addressed by the DKN. The pilot project was done at Kangkar Pulai Flats community and conducted by UTM students from different schools. As the module was designed to be inclusive, holistic and also tailored to the mold the BJB program, the incorporation of multiple discipline was strongly needed. This has been accomplished by the students as they applied their knowledge in the real-world setting. The impact of such activities has benefited both the students and the community towards University for Society.

Key words: *Low-cost Housing; Social housing; Bangsa Johor Bahagia*

1.0 Introduction and Related Works

Bangsa Johor Bahagia Program

The 'Bangsa Johor Bahagia' program is a community project that was inspired by the Sultan of Johor Sultan Ibrahim Almarhum Sultan Iskandar and Permaisuri Johor Raja Zarith Sofiah Almarhum Sultan Idris Shah with the aim to improve the quality of life of the urban poor people in the state of Johor. This pilot project has started early in 2019 and Pangsapuri Kangkar Pulai, a low-cost stratified housing area comprising residents of various races has been selected as the location for the pilot project. These flats have been managed by 4 corporations namely Jentayu, Kenari, Merak dan Nuri, where the majority of flat resident is categorised as B40 group. Many problems and issues arise due to the low income, and financial and economic instability of the residents. The 'Bangsa Johor Bahagia' program has been formulated to create a sustainable residential area and also to curb social problems among the younger generation. Therefore, this program focuses on four main areas: the formation of a happy community, prosperous community facilities, sustainable neighbourhood environment and the formation of an ethical digital community.

Dasar Komuniti Negara

The 'Dasar Komuniti Negara' (DPN) has been initiated by the Ministry of Housing and Local Government (KPKT) in 2019 to address the social housing issues at the local community, particularly in low-cost stratified housing areas across the country. Eight issues of social housing have been highlighted in DPN ranging from anti-social behaviours, vandalism, health care, racist, community welfare and housing maintenance. DPN has then formulated eight clusters with strategies to overcome these issues as shown in Table 1.0.

Table 1.0: The Alignment of the Module with DPN Clusters

Cluster		Strategies		1st Phase Activities
C1	Infrastructure and maintenance (3 strategies)	S1.3	• Improve community skills in joint property management and maintenance	• S.E.E.D (Strata Empowerment and Education Series) by CRES

C2	Cleanliness, environment and health (4 strategies)	S2.2	• Improve environmental management knowledge and skills to be clean and preserved	• Awareness of Energy Usage for Children
C3	Safety (3 strategies)	S3.1	• Ensure a safe and secure living environment.	• Drug Awareness Campaign • Fire Harzard
		S3.2	• Raise awareness and knowledge related to safety aspects.	• Keeping Kangkar Pulai Safe and Secure • Accident Among Children
C4	Education, awareness and skills (4 strategies)	S4.1	• Promote a conducive and effective early education environment.	• Child-Safe Web Browsers • Parental Control Software • Social Media for Kids • Good and Bad Gadget • Creative Development for Kids • Augmented Reality for Education
C6	Entrepreneurship and social business (3 strategies)	S6.1	• Promoting entrepreneurial and business culture.	• Digital Marketing

2.0 NALI Approach Implemented in the Project

For the first phase, this project has incorporated three main disciplines from two different schools and one centre to come out with an inclusive module. Two of them have applied a volunteerism approach among students under academic advising programs - note that this will not be discussed here. Meanwhile, one more has applied a service-learning approach to integrate community engagement experiences in an academic course. In addition, this is a new paradigm shift for the instructor and the students to apply such approach in the course. Some of the assignments and projects have been shifted to align the course learning outcomes and the proposed project. These changes have given the students the chance to apply and deepen their understanding of the course content and examine the relevance of the course in the real world. The programme outcomes have been easily achieved by the students as they were able to relate the reason on why they took the course. The following are the role of each school and centre as shown in Table 2.0

Table 2.0: The Strategic Partners with Their Roles

Schools/Centre	Roles	No. of Students
Azman Hashim International Business School (AHIBS)	Study, plan and manage the right activities and contents based on categories i.e. parent, teenager and children.	61
School of Computing (SC)	Develop a web-based application as a tool to share useful information	5
Centre of Real Estate Studies (CRES)	Design a conducive physical environment to support lifelong learning process within the community	7

3.0 Research Methodology

The project has been embedded in Knowledge Management System course (KMS). Two sections were involved with the total number of 61 students. The following was the plan that has been conducted for the first phase.

i. ***Step 1***: Brainstorming session – A series of workshop has been conducted with students to understanding the aim of the project and further identifying potential solutions to be implemented within the period time given. All students have been encouraged to share the results of their study related to the project in Padlet.
ii. ***Step 2***: Proposal Preparation – 12 groups have prepared activity proposals include a list of tentative and budget needed to implement the activities. The proposals have been illustrated and represented in the form of poster and uploaded in Padlet to share with other groups.
iii. ***Step 3***: Apps Development - 12 activity proposals have been shown to SC students to develop a mobile app. As a result, one of these proposals has been chosen to be developed as mobile apps named as Kids Crafthaven Apps.
iv. ***Step 4***: Engagement and Preparation Meeting - Several meetings have been conducted together with the Perbadanan Merak for the preparation of the proposed activities.
v. ***Step 5***: Implementation of the proposed activities – All 12 activities have been conducted within 2 days.
vi. ***Step 6***: Reflection – Each of students has been requested to give a written reflection on the activities conducted in a proper report

Figure 1.0: Activity Posters

4.0 A Proposed Inclusive Module for Community Service

12 activities have been created in the first phase and more activities will follow in the future for a complete and inclusive module. This is to make sure the success for Bangsa Johor Bahagia program. The activities in the first phase can be seen in Table 1.0 and the posters are shown in Figure 1.0

5.0 Impacts, Challenges and Suggestion

The impact of this project can be seen from multiple views. For students, this project has given them a chance to apply the concept of the KMS course in the real-world setting. They have also built the UTM students attributes indirectly within themselves such as team-working, sharpening communication and negotiating skills and ability to adapt the current environment. For the instructors, a new experience has been gained particularly on how to manage, assess, and deliver the content to be fitted with the project. For the community, they have gained knowledge, awareness and skills to improve their quality lives better. The following are the examples of the students' feedback.

Student #1

"Once I heard the best teacher is experience, I think having this activity is crucial to me as I have learned a lot from this activity, especially in Knowledge Management. This activity helps me to understand more how to share and manage the knowledge that I have to others. From this activity, I also learned how to amplified what I have learned in the class and do it in the real world. Thus, this activity leads me to have an amazing experience and brings me to have well managed in Knowledge management".

Student #2

"From this subject I learned that knowledge management is a lesson in how to cultivate our skills and knowledge within an organization to make progress in the organization, in this subject I also studied many case studies relating to knowledge and management that can be applied directly to the real life, and from the experience from the last activities on December 8, I learned that everyone has different knowledge and skills, but from the process of sharing knowledge and provide activities, it will make us learn something new."

However, the main challenge of this project is community involvement. Less promotion and publicity had influenced the number of residents that joined the activities conducted. At the same time, it rained heavily during the activities and caused a lack of involvement among the residents. As conclusion, the project has achieved the objectives and the students had gained a lot of knowledge and learned on how to actively contribute and engage with the community even having graduated from university. University for Society.

Acknowledgement

We are grateful to the UTM Institute for Life-Ready Graduate (iLeague) for sponsoring this project under UTM Grand Challenges 2019 competition. We also thank to Bangsa Johor Bahagia (BJB) program and Perbadaan Merak to endless support our project.

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Online Service Learning During COVID-19: The Bamboo Tube Project

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Highlights: Production of coin container project has been conducted by Kelab Seni Ukiran Kayu last semester. Project purpose: to expose students to traditional wood crafting and ensure the students be able to share their skills with communities. Challenges: COVID 19 pandemic. Instead of making two projects, we combine the skill training project with service-learning activity and named it "online service learning". Outcomes: students manage to have real experience, acquire the hard-skills and the soft skills and exposed to the importance of preserving the wood crafting techniques. The online videos; educate community to value the art and instil the importance of saving.

Key words: Online; Service Learning; COVID-19

Introduction

Service learning is a strategy that integrates meaningful community service with instruction and reflection to enrich learning experience, teach civic responsibility and strengthen communities (Sandaran, 2012; Maharam et al., 2019). Service Learning Programme entitled "The Production of Bamboo Tube" has been conducted by Kelab Seni Ukiran Kayu UTM (UKQA 2082) for previous semester at Universiti Teknologi Malaysia Johor Bharu. The purpose of this project at that time was to expose undergraduate students to our traditional wood crafting. One of the intended outcome of the project was that the students should be abled to share their skills with any possible communities. In February 2020, COVID 19 pandemic had caused a new wave and hassle in implementing the previously well-planned agenda. As all the schools and community centres were required to be shut down, the opportunity of conducting service learning seems like impossible. With the brainstorming session among lecturer, instructor, and students, we came out with an idea of turning the service learning through the online medium. Thanks to the half-way of students bamboo tube project, we manage to re-design our service learning project with the same mission of sharing with people. With the event of COVID-19 and the emergency remote teaching, the implementation of traditional service learning will be very difficult. Therefore, we proposed an approach of "online service learning" as alternative during the difficult situation. Outcomes of the project are the students manage to have real experience, acquire the hard-skills and the soft skills in wood crafting and exposed them to the importance of preserving the wood crafting techniques. The online videos in the other hand educate the online community to value the art and instill the importance of having a saving.

Design of the online service learning project

The design of online service learning integrate multiphase proses (Dhanapati,, 2016). It starts with the students wood craft learning project conducted face-to face and followed by completion of final finishing, video recording and 'online community' engagement. The innovative phases are as below;

Table 1: 9.2.2020-11.5.2020 (Phase 1-Procees of making bamboo tube)

Date	Activity	Note
18.2.2020	Cutting bamboo	· Mr Fabilah giving instruction · Cutting bamboo · Idtsribution of raw materials.
25.2.2020	Sanding	· Mr Fabillah instruction · Sanding process
3.3.2020	Sanding	· Sanding procees continued
10.3.2020	First layer Finishing	· The undercoat panting · Dry the bamboo.

Table 2: Tuesday 12.5.2020 (Phase 2- During the MCO)

Item	Note
Project	· Those who are still in hostel completing their project
Design	· Those who are at home, proposed the design of the finish project on paper.
Report	· All student submit their progress and prepare to record video on how to make bamboo tube

Table 3: Tuesday 9.6.2020 (Phase 3- Video submission)

Item	Note
Video	· All students need to upload their sharing session of how to make a bamboo tube on; a. E-pembelajaran b. Youtube

To the students, they managed achieved several outcomes such as;

1. All the club members manage to have real experience in using online platform as an alternative source of teaching and learning.
2. All the club members manage to acquire the hardskills and the soft skills through out the semester.
3. This course managed to exposed students to the importance of preserving the wood crafting techniques as our heritage and national art legacy.

Based on students report, below is their overall respond on the online community service learning project;

1. Inspiring online community through a creative work
2. Promote creative thinking
3. Promote community to have saving account.
4. provide a platform and example for future development of online service learning

Acknowledgement

We are grateful for the opportunity provided by Centre of Co-Curriculum Courses and Service Learning (CCSL)UTM and the students who have actively involved and participated in the Wood Craft courses.

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Conceive-Design-Implement-Operate (CDIO) Knowledge and Skills for Innovative Invention Project

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Highlights: This research to identify the importance of CDIO in project development and to determine the generic skills competency in CDIO in producing design project. The skills that are focused by researcher are team working, problem solving and communication skill. This research was done to future graduates for 32 final year students from Bachelor of Technology with Education of Living Skills (SPPH), Bachelor of Technology with Education (Mechanical Engineering- SPPJ)), Bachelor of Technology with Education (Electric and Electronics-SPPR). Quantitative observation method using 5 Likert scale to answer the study was used. Statistical for Social Science (SPPS) version 23 software was also used to get the frequency, percentage and min score value. The result shows that most respondents agree that CDIO is important in producing their project.

Key words: CDIO, TVE institution, knowledge, skills

Introduction (Project or Innovation)

Technical and vocational students should have several technical knowledge and skills that contribute to enhance and improve their role in business and society and also enable students to perform their work with professionalism and success. Students should have the knowledge and abilities for example; teamwork, communicating skills, solving problems and critical thinking where all these outcomes are present in the CDIO Syllabus outcome which is standard 2 (Zhuang, 2008). According to Crawley et al., 2014, where the new and global challenges that exist nowadays have proven that those skills are essential in order to improve and enhance an engineer's masterpiece. All the engineering courses are asked to produce innovative methods in order for their students to acquire soft skills in addition to the core and technical subjects. Jonassen (2000) stated that a design problem is an example of the most complicated and ambiguous goals kinds of problems that students face. For a student to learn the engineering design, the process needs more involvement more from the teacher which translates to not just entering the class and giving instructions according to a design process, but also explains and guides on how to use or make drawings (Warner, 2003). According to De Miranda et al. (2008), the big problem in this is what preparation and training should the teachers get for them to teach engineering design skills, particularly by the in-service teacher professional development program. Thus, this research is investigated either the CDIO approach in knowledge and skills that implemented in invention project together with the NALI to provide the undergraduate students with the appropriate skills in line with industry and technology development.

Objectives

The following are the objectives of this study:

i. To enhance students' interest and attitudes towards CDIO in an invention project
ii. To enhance students' interest and attitudes towards CDIO in an invention project
iii. To increase students' knowledge and skills
iv. To improve the students results in invention projectNALI approach implemented in the research

Novelty

The invention project that offer for TVE students did not highlight the proper procedure to completing the project with appropriated teaching and learning method previously. Thus, the CDIO step was applying in invention project resulted snowball of CDIO knowledge and skills. The students must follow the CDIO step properly during competing the invention project. The knowledge and skills were improved and enhance such as interpersonal personal, technical and also generics skills.

Creativity

CDIO approach varies types of learning such as: Active Learning, Problem Based Learning, Project Based Learning, industrial Based Learning. The lists of CDIO step during completing the invention project as follows:
Cutting Onion Machine, Electro fun technology, Electric Circuit Trainer Kits, Food waste crusher, Portable Educational Trainer Kits, Vibration machine for Perna Viridis, Smart Garden, and Smart Aroma Oven for Roasting Goats.
Furthermore, the CDIO also can be applied to all project such as for engineering student, primary and secondary school and also for teacher or lecturer that teaching project subject or course.

Innovativeness

With this CDIO approach various generic skills for students can be improved and enhance such as; Creative Thinking, Design Thinking, Critics Thinking, Problem solving, Communication skills and Team working. Furthermore, previously when doing the invention project, no highlight on the NALI teaching and learning properly. Thus, with integrated this approach was increased students' knowledge and skills.

Applicability

Apply teaching and learning during NALI such as: Active Learning, Problem Based Learning, Project Based Learning and Industrial Based Learning

Impact on learning and teaching - Performance, Engagement and Empowerment

The effectiveness of learning and teaching is more interactive and active learning has been applied which has been approved from results of the survey by using questionnaire. Furthermore, by applying CDIO has been increased students' knowledge and skills, motivate students to learn effectively during complete the invention project and also guided students doing the project properly refer to CDIO step. Student also need to engage with industry to identify the customer need. Referring to Education 4.0 /21st Century 4C's Skills this CDIO in invention project students can improve the skills of problem solving, team-working, communication skills, critical thinking and also creativity thinking.

Research Methodology (Design and Development)

For the purpose of this study, a non-experimental approach was used to identify the importance and the impact of CDIO approach in terms of skills and knowledge for an innovative capstone project. A quantitative data survey of 5 Likert scale questionnaire was used to collect the numeric data among the students. The online survey of the same 5 Likert scale questionnaire using Google form was used specifically for the lecturers.

These researches focused on of 32 final year students were from 4 SPPR, 7 students from 4SPPJ and 20 students from 4SPPH. These students had the experience of conducting the innovation invention project using the CDIO approaches.

A pilot test was firstly conducted where 5 students was chosen randomly from technical and engineering department to answer the questionnaire. These students are those who also had the experience in conducting the CDIO approach. The Cronbach's Alpha for the reliability was then calculated. The results obtained by SPSS software recorded the Cronbach's Alpha of 0.931, reflecting that the instrument has a high degree of reliability.

Findings/Outcome

The quantitative method survey with 5 Likert scales was used in this study. Table 1 displays the standard deviation, mean and median which were calculated using SPSS 23.0 to find which item the students agree and do not agree with the most. The results and finding of this study are elaborated in sub-section as follows;

Items the Importance of CDIO in invention Project

Table 1 listed the Items used to assess the importance of CDIO in an invention project.

Table 1: Item for the importance of CDIO in an invention project

No. Item		Mean	Median	Std.
1	CDIO strengthens the capabilities and skills of the students.	4.12	4.00	0.80
2	CDIO approach, teacher must act as facilitator and not a lecturer.	4.13	4.00	0.78
3	CDIO motivate students to be independent.	4.17	4.00	0.70
4	CDIO help students measure their own performance.	4.13	4.00	0.63
5	CDIO promote the responsiveness of the faculties' activities towards the enhancement of students' academic performance.	4.00	4.00	0.69
6	CDIO develop the study habits of the students.	4.07	4.00	0.83
7	CDIO challenge students to become more competitive.	4.13	4.00	7.39
8	CDIO practice collaboration rather than competition	3.97	4.00	0.89
9	CDIO creates a mind-set towards a clear direction of learning	3.87	4.00	0.82

The mean value for Item 1 until 9 recorded that the students mostly "agree" with the statement.

Items for CDIO Skills

Table 2 listed the Items for students' survey of the CDIO skills in an invention project.

Table 2: Items for CDIO Skills

No. Item		Mean	Median	Std.
10	Improved student team-working skills. (Teamwork skill)	4.23	4.00	0.90
11	Improved student problem solving skills. (Problem solving)	4.10	4.00	0.76
12	Enjoyable and improve the social skills than formal lectures (Communication skill)	4.03	4.00	1.03
13	Sessions enable student to fully	3.93	4.00	0.87

	participate as a team member. (Teamwork skill)			
14	Develop student responsibility, tolerance, ethics, friendship, and punctuality (Communication skill).	4.00	4.00	0.59
15	Student can design, implement and innovate their product in capstone project. (Problem solving)	4.07	4.00	0.78
16	Student can produce a final product or system in given time. (Problem solving).	4.23	4.00	0.77
17	Student can improve their communication skills. (Communication skill)	3.73	4.00	1.26
18	Students in group can cooperate well and helpfulness each other. (Teamwork skill)	4.00	4.00	0.75

Table 2, shows the statement about the CDIO approach that related to the skill for the mean value of item 10 until 18. From the items, most of the students strongly agreed with that statements. The item 13 shows that the students agree that fully participate as a team member with mean 3.93 however the improvements also need to done in term of responsibility each other to the task given. With reference to item no 17, with this CDIO approach students need to further improve this communication skills to achieved the goal of the invention project at the end of the semester with mean value 3.73.

Potential for commercialization

The IP such as copy write has been registered to protect the research. Furthermore the collaboration with stakeholders such as: Politeknik Malaysia, School and MTUN also can be done. Short series course for technical and vocational institution and engineering department can be given.

Award Received

The teaching and learning regarding of invention project has been involved in the Grand Challenge innovation competition UTM 2018 & 2019 with awarded as silver medal and gold medal and also in IIID UiTM 2018 with silver medal. The title of gold medal is Cutting Onion machine and Vibration machine for Perna Viridis, while silver medal the title of the project is Portable Educational Trainer Kits.

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Scratchtopia Challenge: From Science Experiment to Coding

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Highlights: The proposed project is an innovative science experiments with coding targeted for Year 4, 5 and 6. It consist of E-modules which includes guidelines for installation and familiarization with Scratch applications and Scratchtopia Challenge activities based on science experiments that aligned with the Science Standard-based Curriculum for Primary Schools (KSSR). It contains engaging activities that push the user to find the solution and at the same time develop their thinking skills and problem skills. It can be used as homework or self-study without any laboratory materials/equipment. It helps learners understand the scientific concept in creative ways.

Key words: Science; Experiments; Coding; Elementary Schools

Introduction

The phenomenon of 'COVID-19 learning losses', the academic decline experienced by children as a result of a prolonged school closures has been well documented in many countries and there is evidence that learning losses are more pronounced in children from poorer backgrounds (Bayham & Fenichel, 2020; Abdollahi et al (2020)). To overcome such problem, appropriate accessible educational materials through technology must be designed. However, not all children has access to digital devices or internet connectivity at home. This will widen the equity gaps. Having this in mind, this project developed an innovative science experiments activities with digital technology visual programming languages, for use by primary school students learning science which are currently unavailable in the market. Since research relating to visual programming has been growing (Loganathan et al, 2019), the emergence of visual coding environments should be a step forward in helping vulnerable and disadvantage students to access education flexibly (anywhere, anytime). Those that do exist in the market tend to design to assist programming but not on science experiments. Furthermore, most of the programming language runs online. In terms of the strategy to be adopted to make the intervention competitive, the science experiments will incorporate the use of creative programming (Scratch). Users will use visual blocks like puzzle pieces to solve the problems based on fun and engaging science experiments that align with the primary science curriculum. Hence, it creates a computational thinking environment and improves understanding of a scientific concept. This project also supports the sustainable development goal to address SDG3 (good health and well being) and SDG4 (quality education).

Project Objectives

The objectives are to increase students computationalt thinking skills and the science experiments learning process.

Innovative Approach Implemented

The idea of this project is an improvement from our previous project that focused on secondary chemistry concept that had gained positive impact on students' attitude and motivation towards chemistry. Under this circumstances, this project In terms of the strategy to be adopted to make the intervention competitive, the science experiments incorporate the use of creative programming by using the Scratch application that can be accessed offline or online. Users use visual blocks for the two main characters, namely Oyen and Scibot. Hence, it creates a computational thinking environment. This project also supports the initiative to address sustainable development goal (SDG), SDG3 (-good health and well being) and SDG4 (quality education) that is to ensure inclusive and quality education for all and promote lifelong learning. Moreover, copyright has been filed. The project will help in terms of addressing gaps in basic services, ensuring access to quality education for all through making greater use of information and communication technologies. As a result the project will improve students' achievement in science specifically, as well as 21st century skills.

Methodology

The impact was measured through performance tests (pre and post-tests), computational thinking and science learning process questionnaires, were used as instruments to evaluate the effectiveness of the project. Thirty students from a primary school in Johor Bahru was selected for the study.

Findings and discussion of the project

Based on the computational thinking skills questionnaires, the posttest mean (M=93; SD=7.35) showed higher mean scores compared to the pretest (M=56; 7.20) as stated in Table 1.

Table 1: Computational Thinking Skills Mean Scores and Standard Deviation

Construct	Pretest	Postest
Computational thinking skills	56 (7.20)	93 (7.35)

Wheras in Table 2, it was found that 75% of the students agreed they were actively participated in doing the visual programming for science experiments and agree that the Scratchtopia Challenge activities can enhance their learning performance and learning process. For enjoyment construct, most of the students showed positive impact as the percentage for items in enjoyment construct is around 81%.

Table 2: Scratchtopia Challenge learning process

Construct	% of agree
Active Learning	75
Perceived Usefulness	75
Enjoyment	81

Award received

5 star rating for Scratchtopia Challenge: Computational Thinking Skills for B40 Students from University Teknology Malaysia CCIN on 15 January 2020. Gold award for EZ-prog : an easy color schematic model for programming problem solving that impact on students' computational thinking skills, in the *Kongress dan Pertandingan Inovasi P&P Pembelarajan Aktif Futuristik Melangkau* 2020, organized by Universiti Kebangsaan Malaysia, 5th to 6th February 2020.

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Inquiry-Based Science Education Approach to Improve Student Learning of Computer Science in Classroom

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Highlights: The conventional approach of learning is currently outmoded for today's students to equip them with real-life situations, mainly because knowledge and life skills are acquired passively from the instructors. In recent years, inquiry-based science education (IBSE) has provided pupils and teachers with opportunities to actively engage in collaborative learning via inquiry. This approach inspires the students to become active thinkers, to research for solutions, and to gain life-long experience and self-confidence. This project investigates the impact of IBSE based computer science learning in a classroom. The results of implementing an IBSE for the computer science subject are presented and described.

Keywords: Inquiry-based science education; Student-centered Learning; Computer science; Collaborative Learning.

Introduction

Nowadays, as societies become more knowledge-based, schools must evolve to ensure the information and skills needs of students (Cynthia, 2015) are also enhanced. The educational systems are expected to transform from institutions with a strong emphasis on teaching to organizations with an increased emphasis on learning. Twenty-first-century teachers are required to assess their students' knowledge and skills. Educators are also tasked to identify and design learning activities, to help them achieve a deeper understanding of learning. Active learning can take several slightly different forms, such as the inquiry-based approach and project-based methods.

Computer science, unlike the natural sciences such as physics and biology, is not a study of a pre-existing world, but rather a world created by man (Calmet, Hirtzig, & Wilgenbus, 2018). Inquiry-based learning is a constructivist approach in which the pupil constructs knowledge himself based on experience gained during independent active activity. The inquiry-based approach applies to both the study of natural objects and that of artificial objects. Moreover, studying a "science of artificial objects", such as computer science, requires the learner to build these objects themselves. According to Calmet, Hirtzig, and Wilgenbus (2018), there are three general phases of the inquiry-based approach, namely (i) questioning – initiated by the teacher or the students, that give rise to the forming of theories; (ii) research – which may be an experiment, observation or documentary study; (iii) structuring of knowledge which in turn leads to more questioning, more research.

The main objective of this research project is to investigate how the primary-school teacher supports pupils through an inquiry-based science education approach for computer science specifically coding skills. Meanwhile, the specific objectives of this project are: (i) to identify teaching and learning tools used in the IBSE approach, and (ii) to examine the impact of implementing IBSE to improve students' computer science learning.

Literature Review

Inquiry-based learning in Malaysian schools is still considered to be an innovative approach to teaching, where it is based on the active exploration of new knowledge by pupils themselves. It allows deeper involvement of pupils in the learning process, encourages motivation and differentiation of individual learning preferences, creates space for pupils to develop cooperation and communication skills.

Inquiry-based learning is one form of active learning that encourages students to fully engage in the learning process. It emphasizes the student's role in the learning process whereby they need to explore the material, ask questions, and share ideas. This allows them to build knowledge through exploration, experience, and discussion. It also shares many of the characteristics of Problem Based Learning and Project-Based Learning, where students are faced with a task to do and have to discover for themselves, with appropriate facilitation. The students will experience their knowledge gaps and deficiencies they may have, along with the skills they may need to develop in the learning process.

According to Gordon and Brayshaw (2015), the properties of inquiry-based learning consist of; (i)the task is based on an open problem — open in the sense that there are numerous approaches to the solution; (ii) the student(s) are presented with the problem and must discover for themselves the nature of the problem, and in particular to identify what knowledge and skills they will need to investigate and develop to solve the problem; (iii) the students are required to demonstrate self-analysis and critical thinking to choose between several possible solutions and approaches; and (iv) the teacher or lecturer acts as a facilitator in the process. An inquiry-based learning framework is shown in Figure 1 (Pedaste et al. 2015).

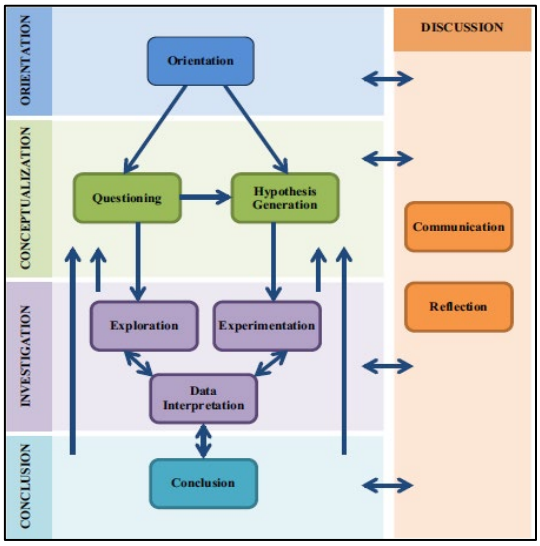

Figure 1: An inquiry-based learning framework (general phases, sub-phases, and their relations) (Pedaste et al. 2015)

Research Methodology

This study employs a qualitative research design whereby data were mainly obtained through interviews, analysis of in-class observations, and video recording. Observations on the approach of teaching and learning applying the IBSE were documented. An IBSE approach using 5E (Engage, Explore, Explain, Elaborate and Evaluate) was introduced to Year 5 pupils at SK Raja Bahar Kota Jembal, Kota Bharu Kelantan to introduce them to the binary number concept in computer science. A total of 15 male and 10 female pupils were involved in this learning session. The 5E model is similar to the IBSE learning framework that is shown in Figure 1. The summary of the learning implementation is shown in Table 1 as follows.

Table 1: Summary of the learning implementation

<table>
<tr><th>IBSE proses flow</th><th>Learning Implementation</th></tr>
<tr><td>Orientation
(Engage)</td><td>The initial phase to introduce the binary number concept is implemented by cultivating curiosity and questions among the pupils. Before further dwelling into the learning contents, a figure consisting of binary numbers, 0 and 1 is shown with a question, what do the binary numbers imply for a computer system. An open discussion session is implemented to obtain possible answers from the learners. This step will initiate the thinking process for learning.</td></tr>
<tr><td>Investigation
(Explore)</td><td>After the orientation process, the pupils explore the binary number concept using a scientific procedure of experimentation and exploration. The pupils are given a set of binary cards of 0 and 1, where exploration of 1 bit, 2 bits, 3 bits, 4 bits, and 5 bits binary number formats are devised. This exercise is implemented in a group of 3 to 4 pupils.</td></tr>
<tr><td>Conceptualization
(Explain)</td><td>After the exercise on the binary number formats is finished, the pupils are given an exercise sheet to obtain a deductive conclusion on the possibilities of each number format. Facilitation is implemented to illustrate the computing storage capacity for each number format, for example, a 1-bit system can only store 2 possibilities of events and memory such as yes or no, on or off, and day and night. For a 2 bit system, 4 possibilities of memory can be achieved such as north, south, west, and east. A combination of 3 bits and 4 bits systems enables 8 and 16 combinations of possible information.</td></tr>
<tr><td>Discussion
(Elaborate)</td><td>The pupils are required to elaborate further on this possible binary combination with an exercise to create a secret password by using 4 bits binary number formats. Herein, the pupils are required to implement this exercise to decode the binary number arranged to decimal notations that are understood by humans.
<table>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>Answer</td></tr>
<tr><td>(x8) 2^3</td><td>(x4) 2^2</td><td>(x2) 2^1</td><td>(x1) 2^0</td><td></td></tr>
<tr><td>8</td><td>0</td><td>0</td><td>1</td><td>9</td></tr>
</table>
</td></tr>
<tr><td>Conclusion
(Evaluate)</td><td>To conclude the IBSE session, we evaluate the formative exercise worksheet returned by the pupils and observe the experiments implemented in the learning process. Secret codes in a computer system such as 1001 0001 0011 1000 0110 0010 0100 are decoded into decimal numbering recognized by humans to show the different numbering systems used by humans and computers.</td></tr>
</table>

Finding and Discussion

The findings revealed that the IBSE employed were able to stimulate excitement among students when learning computer science. Adopting IBSE could help the students appreciate computer science subject, and apply a higher level of thinking to their work because it engages students in investigating real-world questions and it enables students to discover knowledge through collaborative learning.

Acknowledgment

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Inculcating of Entrepreneurial Skills Among Civil Engineering Students Through UHAK UBSS 1032

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Highlights: This research aimed to study the entrepreneurial skills of the first-year civil engineering students in UHAK-UBSS 1033 subject through survey and interview before and after the course. This subject involves four projects which are: Interview with the established entrepreneur, Sustainable Entrepreneurial Mindset Showcase (SEMS), Need-Approach-Benefit-Competition (NABC), Business Model Canvas, and entrepreneurial activities. Frequency analysis showed that most beginners were concerned with personal quality of strength to run a business while experienced students were keen on the business management's capabilities of leadership to solve problems. This study emphasizes the importanceof integration of social and emotional of constructivism in classrooms.

Keywords: Entrepreneurial Skills; Constructivism; Civil Engineering Student

Introduction

Owing to the dynamic economic, workforce, and technical needs that have significantly challenged the conventional nature of engineering practice, the need for engineering students to develop entrepreneurial skills has been widely recognized (Duval-Couetil, Reed-Rhoads, and Haghighi, 2010; Duval-Couetil, Reed-Rhoads, and Haghighi, 2010; Lienberg and Matthews, 2012). Entrepreneurial skills have been identified in the Malaysian Code of Practice for Program Accreditation as competencies that engineering graduates must obtain upon completion of their studies (Malaysian Certification Agency, 2008). In addition, the Malaysian Engineering Accreditation Council (EAC) expects the graduates to gain project management and finance expertise (EAC, 2012).Suggested by the American Society of Civil Engineering of 2025 vision, potential civil engineering students should exhibit professionalism in the entrepreneurship as to be a successful engineers in practice(American Society of Civil Engineering students, 2007). Instead of strengthening theory, this subject adopting a new pedagogy which encourages the learner to construct a sense of her own self, the development of autonomy, alongside progress within the group for interpersonal growth. Employed by this study, constructivist pedagogy is one such approach where activities are proposed to students that are meaningful for them and the learner reflects researches, uses capacity for taking initiatives, creative and may followed by usage of technology. Therefore, the characteristics of the constructivism that has been developed by entrepreneurial skill in a sense can be observed for engineering students in general by performing a survey to examine the prominent entrepreneurial skills in the context of civil engineering studies.

NALI Approach Implemented in The Research

Constructivist learning strategies can be developed using principles of social constructivism to improve academic achievement, high order thinking skills and social and emotional skills of the students. As listed in Figure 1, Constructivist environment in a classroom can be created by adopting the following: Entrepreneur Profile **(CLO1)** can be achieved by **providing experience with the knowledge construction process**, pitching of the business idea **(CLO2)** by **experience in and appreciation for multiple perspectives**, Business Model Canvas (BMC, **CLO3**) by **providing social and emotional learning**, and experiential entrepreneurial activity **(CLO4)** by **using multiple modes of representation of technology approaches of marketing like Facebook , Instagram or WhatsApp**. This course consists of four team-based projects that represent each of the CLOs in Table 1. The entrepreneur profile project requires students to interview one successful entrepreneur and report the background of the entrepreneur, products, key success factor, challenges, and advice. The project eventually provides an opportunity to learn the entrepreneur's journey and experiences. Based on the inspiration gained from the entrepreneur, students will brainstorm their innovative business idea and pitch within 3 minutes using the NABC approach. Afterward, the innovative business idea will be transformed into a BMC, which requires validation and the development of a prototype so it can be enlisted for the Sustainable Entrepreneurial Mindset Showcase (SEMS). For the last project of experiential entrepreneurial activity, students were required to build a small-scale business activity and utilize a digital commerce platform. In this study, a quantitative research design was employed to focus on the skills students acquire before and after the entrepreneurship course according to their experience when performing the four projects. A survey of 240 students was used to gather information from first-year civil engineering students.

Project Objectives

The objective of the study is to examine the prominent entrepreneurial skills during Teaching and Learning (T&L) in the context of civil engineering studies for a subject of 'Introduction to Entrepreneurship' is a two-credit hour course with 240 students in the class. There are multiple sections facilitated by different lecturers. The students' performance is assessed based on four course learning outcomes with four projects, as shown in Figure 1.

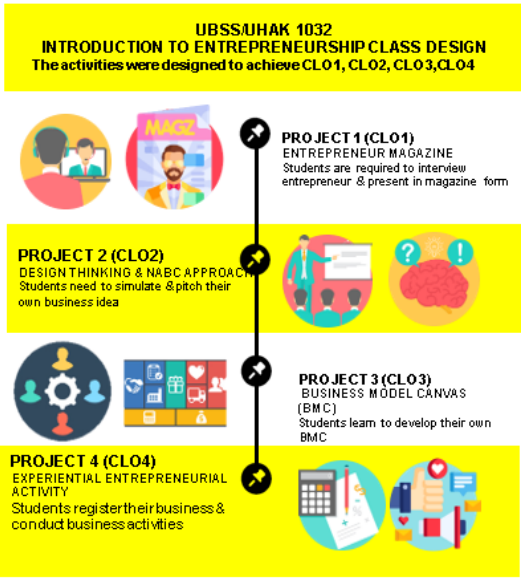

Figure 1: Course learning outcomes for the Introduction to Entrepreneurship subject

All these CLO listed in Figure 1 involved T&L materials such as samples of interview with the established entrepreneurs (CLO1), published NABC (CLO2, BMC posters (CLO3), teasers, social media references, e.g., Jovian Mandagie (Fashion), AbsolutChocolate(Food) and LenteraCreative Home (Interior Design Service) for CLO4. T&L activities involved is cooperative learning such as snowball, respond-react-reply during the video sharing. For assessment, a rubric is given as guidelines for Constructive Alignment by monitoring their activities by using the group chat (WhatsApp) and social media of their entrepreneurial activities.

Research Methodology

The survey and interview were distributed via group chat because of the difficulty of making appointments during the movement control order (MCO) by the Ministry of Defense Malaysia in Semester 2, Year 2020/2021. The CLOs by the School of Civil Engineering (See Figure 1) were used to identify suitable respondents based on the criterion that the civil engineering students must have enrolled at least once in an entrepreneurship course during their undergraduate studies. The students' demographic is predominantly Malaysian citizens with a mixture of some international students. The part of entrepreneurship skills they acquired was measured using frequency analysis to arrange the result in the form of a percentage. The formula to measure the frequency is as follows:

$$\text{Percentage (\%)} = \frac{\text{Frequency of occurrence}}{\text{Total number of respondents}} \times 100$$

Findings and Discussions

This survey was designed to measure self-assessed entrepreneurial knowledge and constructivist learning environment of this subject. The items were initially based on a pre-existing taxonomy developed under EAC, CLO projects outlined by the Faculty of Engineering, Universiti Teknologi Malaysia. The survey and interview are circulated at the beginning and end of the subject of 20 initial constructivism elements in the entrepreneurship skills that these students have obtained throughout one semester. Figure 2 lists the skills related to the teamwork that the courses have achieved based on the CLOs that have been set for the subject.

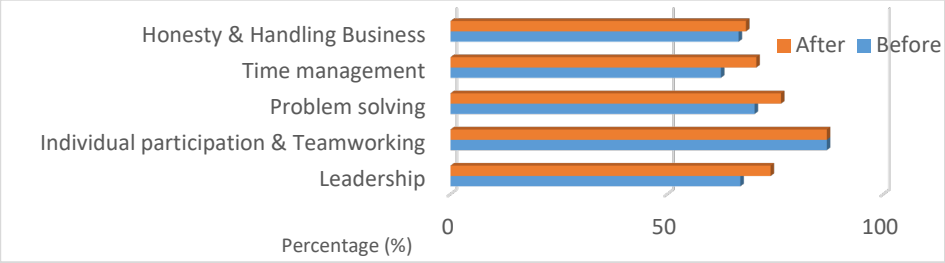

Figure 2: Percentage of five groups of entrepreneurial skills

Based on the key performance indicatorin the CLOs, and constructivist learning strategies this entrepreneurial skills survey developed by outlining 15 questions divided into five areas: 1) Individual participation and Teamwork, 2) Leadership, 3) Problem solving, 4) Time management, and 5) Honesty and Handling Business. These five key skills were then analyzed into key skills by citing their quotations. Although both gave positive remarks, most of the beginners found the importance of individual strength, confidence, and teamwork abilities, whereas experienced- entrepneur students preferred to have good technical skills in a group and the ability to manage disputes and give solutions as soon as possible. Given by the conversations below are intended to be useful for their curricular development and best practices in the classroom and beyond.

"…more optimistic in problem-solving during hard time like MCO"

"Learning new techniques and strategies through four projects are essentials "

Commercialization Potential

In the future,the authors plan to develop tools through an expanded study that statistically compares different approaches to engineering entrepreneurship with the different backgrounds and interest of students. The course and program content, pedagogical models, and institutional characteristics must also be examined more closely to identify practices that best prepare engineers for the future.

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EZ QURAN

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Sorotan: Selaras dengan era globalisasi dan dalam memenuhi keperluan industri yang memerlukan tenaga mahir TVET ditransformasikan daripada segi penyampaiannya bagi mempertingkatkan tarikan sebagai laluan pendidikan pilihan utama. Selain pelajar aliran TVET dibekalkan kemahiran bagi melengkapkan diri untuk memenuhi keperluan industri masa kini, mereka juga disajikan dengan ilmu kerohanian bagi melahirkan insan yang harmonis dan seimbang seiring dengan Falsafah Pendidikan Negara yang mana reformasi TVET ini dapat melahirkan modal insan kelas pertama, mempunyai kemahiran dan kebolehpasaran tinggi dan mempunyai kehidupan sebagai pemimpin yang bermatlamat serta bersandarkan kehidupan yang mengabdikan diri kepada Tuhan. Pada abad ke-21 ini, kepentingan dan kelebihan menggunakan alat ICT dan perisian yang bersesuaian dapat menarik minat para pelajar pada zaman ini yang merupakan peribumi digital alat ICT dan perisian. Dengan menggabungkan beberapa aplikasi yang ada pada hari ini, paparan EZ Quran bukan sahaja menarik perhatian pelajar, malah guru dapat membuat penilaian serta mendapat maklum balas secara langsung semasa mengendalikan sesi PdPc.Menurut penelitian data kuantitatif yang dikumpulkan daripada ujian diagnostik dan ujian pascapengajaran, penggunaan EZ Quran dapat meningkatkan penguasaan bacaan Al-Quran di kalangan para pelajar. Rumusan ini juga disokong dengan dapatan daripada tinjauan yang dilakukan selepas pengajaran iaitu 81.25% pelajar sangat setuju dan 18.75% pelajar setuju dengan penyataan " Saya lebih menguasai bacaan Al-Quran yang dijalankan dengan menggunakan EZ Quran". Pelajar juga memberi maklum balas bahawa mereka dapat mengingati pelajaran yang diajar dengan lebih mudah dengan menggunakan EZ Quran berbanding sebelumnya. Para guru boleh cuba untuk menggunakan perisian ini bagi meningkatkan minat serta penguasaan pelajar dalam mempelajari Al-Quran terutamanya pelajar aliran TVET. Daripada kajian yang dijalankan, penyelidik mendapati bahawa kaedah pengajaran Al-Quran secara tradisional tidak dapat membantu pelajar dalam menguasai bacaan Al-Quran dengan baik. Oleh yang demikian, dengan adanya perisian EZ Quran, ia dapat menarik minat pelajar untuk mendalami ilmu Al-Quran serta meningkatkan penguasaan bacaan Al-Quran.

Key words: Al-Quran; TVET; & ICT.

Pengenalan

Guru-guru mendapati sebahagian besar pelajar mempunyai daya tumpuan yang singkat dan lebih cenderung kepada pembelajaran yang bersifat interaktif. Hal ini sejajar dengan sistem Pendidikan TVET MARA untuk menyediakan aliran yang dapat menampung pelajar yang lebih cenderung terhadap pembelajaran yang bersifat teknikal dan vokasional (Uma Natarajan & Margery Osborne, 2006). Selain itu, pelajar sering hilang tumpuan atau tidak fokus semasa pengajaran guru. Hal ini menjejaskan pembelajaran dan pemahaman pelajar terhadap apa yang sedang diajarkan.

Pengamatan tentang pencapaian pelajar IKM Johor Bahru dalam penguasaan bacaan serta kefahaman Al-Quran yang lemah kerana kaedah pengajaran Al-Quran secara tradisional kurang sesuai menyebabkan pelajar mudah bosan dan hilang fokus ketika mempelajari serta mendalami ilmu Al-Quran.Guru juga mendapati bahawa pelajar jarang membaca Al-Quran kerana tidak mampu untuk membaca dengan betul dan lancar.

Projek inovasi EZ Quran ini tercetus kerana ingin membantu pelajar dalam meningkatkan penguasaan bacaan Al-Quran. Perisian ini adalah gabungan beberapa elemen iaitu Powerpoint, Google Slide, Nearpod dan Google Site untuk menghasilkan persembahan PdPc yang lebih menarik dan interaktif.

Objektif

1. Menyediakan alternatif teknik PdPc yang lebih interaktif dan menarik kepada guru dan pelajar.
2. Membantu pelajar meningkatkan penguasaan bacaan serta kefahaman Al-Quran (Ayat dan surah terpilih).
3. Menilai sejauh mana keberkesanan EZ Quran kepada pelajar.

Kaedah Perlaksanaan

Kaedah perlaksaan adalah menggunakan Kaedah *Pre and Post.* Penilaian *Pre* dilaksanakan secara tardisional di mana guru menerangkan tatacara bacaan yang betul serta kefahaman ayat dengan menggunakan teknik syarahan sahaja. Seterusnya guru menggunakan bahan bantu pengajaran dan pembelajaran dengan EZ Quran untuk mendapatkan hasil perbandingan antara keduanya.

Setiap pelajar diminta untuk membuka telefon bimbit masing-masing. Pelajar dikehendaki untuk melayari laman web yang dipaparkan oleh guru. Pelajar dikehendaki untuk menekan pautan yang disediakan oleh guru di laman web tersebut. Kemudian pelajar akan diberi kata laluan untuk membolehkan mereka mengakses slaid yang disediakan oleh guru. Slaid pengajaran semuanya akan terpapar pada skrin telefon bimbit pelajar. Pengajaran diteruskan dengan mengikuti setiap slaid yang telah disiapkan. Pelajar diberi penerangan mengenai objektif yang hendak dicapai pada awal pembelajaran.

Pelajar kemudiannya diberi peluang untuk menyebut perkataan yang dipaparkan pada skrin telefon bimbit masing-masing. Mereka digalakkan untuk membaca dengan kuat perkataan yang diberi. Pelajar boleh membaca perkataan tersebut bersama rakan-rakan mereka.. Pelajar juga dapat membantu rakan-rakan mereka dalam menguasai bacaan Al-Quran. Seterusnya, guru menerangkan dan menekankan aspek tajwid. Selepas itu pelajar mengisikan tempat kosong dalam sebuah ayat dengan hukum-hukum tajwid yang diberikan. Guru menunjukkan hukum tajwid yang betul kepada pelajar. Kemudian guru akan memaparkan slaid berkaitan dengan kefahaman ayat Al-Quran dan beberapa aktiviti juga disediakan untuk mengukuhkan kefahaman para pelajar.
Data yang dikumpulkan merupakan ujian lisan yang dijalankan kepada pelajar. Markah ujian lisan pertama merupakan markah sebelum pelajar menjalani intervensi yakni dengan menggunakan EZ Quran. Sementara markah ujian lisan kedua ialah markah yang pelajar perolehi setelah melalui proses pengaplikasian EZ Quran.

Metodologi

Metodologi yang dijalankan di dalam merangka projek inovasi ini adalah berasakan konsep **ADDIE**.

1. Menentukan keperluan pelajar.
   Pelajar perlu menguasai bacaan dan kefahaman Al-Quran mengikut silibus yang telah ditetapkan.
2. Menentukan matlamat dan objektif.
   Pelajar menguasai bacaan serta kefahaman ayat Al-Quran dengan baik.
3. Membina prosedur penilaian
   Prosedur penilaian yang diberikan berdasarkan kepada skima pemarkahan yang telah ditentukan.
4. Mereka bentuk dan memilih startegi penilaian
   Penilain yang akan diberikan berdasarkan kepada kelancaran bacaan ayat yang telah ditetapkan dan pelajar dapat menghurai maksud ayat tersebut serta menghubungkaitkan dengan isu semasa.
5. Mencuba sistem pengajaran
   Alat bantu pengajaran yang dibina dapat menarik perhatian pelajar dan menunjukkan minat dalam pengajaran dan pembelajaran Al-Quran.
6. Menilai keseluruhan sistem
   Alat bantu pengajaran dan pembelajaran ini dapat meningkatkan penguasaan bacaan dan kefahaman Al-Quran kepada pelajar.

Hasil Dapatan

Menurut penilitian data kuantitatif yang dikumpulkan daripada ujian diagnostik dan ujian pasca pengajaran, penggunaan EZ Quran dapat meningkatkan penguasaan bacaan Al-Quran di kalangan para pelajar.

Rumusan ini juga disokong dengan dapatan daripada tinjauan yang dilakukan selepas pengajaran 81.25% pelajar sangat setuju dan 18.75% pelajar setuju dengan pernyataan " Saya lebih menguasai bacaan Al-Quran yang dijalankan menggunakan EZ Quran". Para pelajar juga memberi maklum balas bahawa mereka dapat meningkatkan bacaan serta kefahaman Al-Quran lebih baik dan mudah berbanding sebelumnya.

Pencapaian

1. Apprentice Innovation Research Exhibition AIREx 2020.
   UniKL MIMET.
   A.Gold Medal.
   B.Best Award -3rd Place

2.Teaching Enhancement & Learning Innovation Carnival 2020 (TeLiC'20).
   Universiti Malaysia Kelantan.
   Gold Medal.

3.International Summit On Innovation & Design Exposition (INSIDE 2020).
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Silver Medal

4. National Innovation and Invention Competition Through Exhibition (i-Compex 2020).
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Doing project-based learning online: Benefits and Pitfalls

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Highlights: COVID-19 pandemic has disrupted ways of conducting project-based learning. Last year, the researchers did project-based learning in ordinary ways. Now, teaching and learning activities go online. Adjustments on original plans were made. The researchers (the instructor) and students interacted using online platforms. From students' reflections, verbal and written, they experienced a new practice in doing projects in online platforms, particularly in conducting online interviews. Nonetheless, the students were not fully satisfied with doing the project online because they cannot meet team members face-to-face. Less satisfaction was felt. However, online learning provided the students with a new experience in handling project online, especially in collecting data through online interviews. Advantages and disadvantages of online project-based learning are captured and discussed.

Key words: Online project-based learning; curriculum development; research skills

Introduction and background of the research

Doing project-based learning is something common and is quite pervasive. Projects can equip students with necessary research skills and generic skills such as conducting interviews and developing communication skills. However, the pandemic of COVID-19 has changed the norm where teaching and learning activities go online. Adjustments on regular plans are needed to respond to the pandemic.

In the course of Design and Implementation of Physics Curriculum (DIPC), the instructor (the researchers) have developed a systematic way of doing project-based learning. The systematic process has been awarded intellectual property protection in 2020 by the MyIPO.

Now, all the process of doing the project becomes online. The instructor and students needed to interact using online platforms, especially Universiti Teknologi Malaysia (UTM) e-learning, Google Meet, Zoom, and WhatsApp. Nonetheless, the instructor was not sure whether students could learn in an online learning environment for project-based learning. Hence, the instructor conducted a study from students' feedback, verbally and in written forms.

NALI approach

In this research project, the approach of project-based learning was adopted. Project-based learning is part of the New Academia Learning Innovation (NALI) approach (Alias & Aris, 2016). Only for the semester II 2019/2020, the project-based learning was conducted online due to COVID-19 pandemic.

The online project-based learning was done using the same steps as face-to-face approaches but just shifted to online modes. All critical aspects were done as face-to-face, but some adjustments were made, such as asking students to conduct interviews online and presenting the project online.

Research methodology

The researchers developed a systematic process of conducting online project-based learning. The process involved these steps.

(1) Briefing the students about project-based learning.

(2) Asking students to form a group.

(3) Each group needed to do plans on the project, which was producing a mini curriculum of physics for secondary school students and executed the project.

(4) Each group reported their current progress from time to time, weekly basis.

(5) Each group revised their writing based on the feedback given by the instructor.

(6) Each group finished their writing.

(7) Each group presented their project to the instructor.

(8) Each group provided feedback on their journey on doing the project, verbally and in written formats.

Finding and discussion

From students' reflection, they mentioned two sides of online project-based learning: (1) limitations and (2) opportunities. For the limitations, they stated that they felt less satisfied when doing the project because they were unable to discuss with friends and the instructor directly, face-to-face. They wanted to meet the instructor to share their challenges in doing the project. However, due to the pandemic, they wrote messages in WhatsApp to the instructor via the group message. They felt that writing messages were somewhat less impactful than talking directly, face-to-face, to the instructor. They sensed that the messages were "not delivered" to the instructor because of the use of online approaches. This situation was deemed the limitations of online project-based learning.

The element of affection is important in education because students are humans that want to get particular attention and valuable knowledge from the instructor. Absence of human aspects is evident. Nonetheless, this situation could be handled by ensuring that the students could continuously communicate with the instructor using online face-to-face interaction that turns on video that shows instructors' and students' faces. Facial expression may enrich the instructors' perspectives on how students were feeling. At least, students would be able to express their concerns and/or ideas using the live session (synchronous) even though they still prefer face-to-face, direct communication with friends and the instructor.

On the other hand, the use of online approaches in conducting project-based learning also offered new opportunities to students. The students mentioned that they were now confident in conducting online interviews. They never had experience in doing such activities before. The pandemic has indeed made students more capable in collecting research data online for their project.

In normal days, the use of face-to-face interviews is common because researchers like to see research participants directly. However, this is not applicable during the pandemic because all people were locked down. Hence, the only option available was to ask students to conduct online interviews. Even though they initially not liked the online interview methods, they could now see how the methods might be able to provide flexibilities in doing research.

This is even valuable for their master's research project that they need to go through before completing their master's degree. In other words, the use of online data collection, specifically online interviewing, seemed feasible for students. They could save travel expenditures because the use of online interviewing methods does not have any cost compared to the face-to-face that requires certain money to be used for travels.

Online project-based learning seemed to have some limitations (Hilliard, Kear, Donelan, & Heaney, 2020), but it also offered new learning experiences, especially in doing online research data collection. The approach was indeed not perfect, but it could be able to solve problems when the pandemic happens. In fact, students realised that they learned how to complete their project according to what was initially planned. Adjustments done were not significant because the systematic process of doing project-based learning was transformed into online approaches.

The key lesson was for the instructor to try to be more concerned when conducting online project-based learning because students learned in their respective learning spaces that were diverse and somehow could not be understood by the instructor due to complexity of each situation. Students' lives during the pandemic were quite challenging because they never learned online totally. Hence, all instructors, including the researchers, would need to be someone who could have good relationships with students to ensure students' hardship or challenges in learning and doing the project online would not burden them extremely. Interactions must be increased (Mehall, 2020) to ensure instructors and students can understand challenges in online project-based learning and provide support to students when necessary.

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Kesan Aplikasi Augmented Realiti Kesedaran Covid-19 (AR3W) berdasarkan Teori Kognitif Pembelajaran Multimedia

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Sorotan: Persekitaran pembelajaran kini berubah pantas selaras perkembangan Revolusi Perindustrian 4.0. Antara teknologi terkini dalam bidang pendidikan ialah Augmented Realiti (AR). Teknologi AR membolehkan pengguna berinteraksi dengan dunia maya digabungkan ke dalam dunia sebenar dalam masa nyata. Kesedaran Covid-19 dalam kalangan pelajar sekolah sangat penting. Justeru itu, inovasi teknologi AR dibangunkan dikenali AR3W bagi penyampaian maklumat interaktif secara maya yang muncul dalam persekitaran dunia sebenar. Dapatan menunjukkan persepsi pelajar secara signifikan secara keseluruhan sangat tinggi iaitu mendapat respon positif dalam aspek memudahkan penyampaian maklumat yang interaktif, berinformasi, memberi kefahaman, memotivasikan dan menarik berkaitan pencegahan Covid-19 apabila menggunakan aplikasi AR3W.

Kata Kunci : *Augmented Realiti; Teknologi; Pendidikan; Kesedaran Covid-19*

Pengenalan

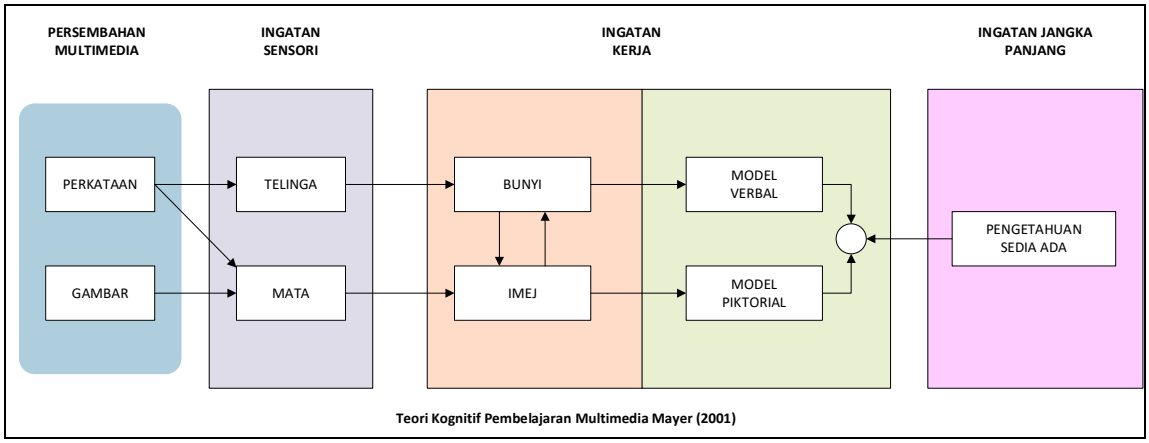
Persekitaran pembelajaran kini berubah dengan pantas berdasarkan kemahiran dalam pembelajaran Abad Ke-21 dengan elemen STEM (Sains, Teknologi, Kejuruteraan, & Matematik). Dengan keadaan dunia pada masa kini dalam pandemik Covid-19, perubahan kaedah belajar secara norma baharu seperti penjarakan fizikal menjadi topik perbincangan penting. Antara teknologi yang boleh digunakan untuk mengatasi permasalahan ini adalah dengan menggunakan teknologi Augmented Realiti (AR) yang dapat mencipta ilusi dalam dunia sebenar melalui lapisan digital maya bagi meningkatkan visualisasi spatial. Augmented Realiti (AR) boleh ditakrifkan sebagai teknologi yang digunakan bagi objek dunia maya digabungkan ke dalam dunia sebenar dan muncul bersama-sama dalam ruang yang sama pada dunia sebenar (Akçayır & Akçayır, 2017). Kajian oleh Mohd Fadzil & Mohd Nihra Haruzuan (2019) menyatakan kepentingan pembelajaran konvensional di tukar bentuk kepada teknologi aplikasi peranti pintar bagi meningkatkan kualiti pembelajaran. Jangkaan bahawa akan terdapat lebih banyak penyelidikan mengenai AR di masa depan kerana teknologi ini mempunyai potensi dan faedah yang besar terutama dalam persekitaran pembelajaran (Danakorn et al., 2013). Kajian lepas menunjukkan ramai murid menghadapi masalah dalam membuat penaakulan dan penyelesaian masalah adalah disebabkan keupayaan visualisasi spatial yang rendah untuk mengimaginasi kandungan bahan pembelajaran (Khor & Ruzlan).

Objektif

i) Membangunkan Aplikasi Augmented Realiti Kesedaran Covid-19 (AR3W) berdasarkan Teori Kognitif Pembelajaran Multimedia.
ii) Mengenalpasti persepsi pelajar terhadap penggunaan aplikasi Augmented Realiti Kesedaran Covid-19 (AR3W) yang dibangunkan berdasarkan Teori Kognitif Pembelajaran Multimedia.

Kerangka Teoritikal

Pembangunan Aplikasi Augmented Realiti (AR) berdasarkan Teori Kognitif Pembelajaran Multimedia *(Mayer, R. E. , 2001)*



Dalam merekabentuk kandungan bagi Aplikasi Augmented Realiti (AR), kandungan pembelajaran tersebut mengandungi unsur visual dan audio berdasarkan Teori Kognitif Pembelajaran Multimedia iaitu menurut Mayer (2001) yang membahagikan saluran maklumat kepada dua iaitu audio (verbal) dan visual (gambar). Secara ringkasnya, dapat dijelaskan bahawa pelajar mampu mengalami pengalaman pembelajaran yang lebih baik dan tersusun melalui persembahan multimedia atau dikenali sebagai pembelajaran multimedia yang mempersembah maklumat penting dalam format teks dan gambar.

Demo Penggunaan Aplikasi AR3W

Pelajar akan muncul secara teknologi AR di atas hebahan cetakan kesedaran Covid-19 seolah-olah hologram. Kandungan maya tersebut akan menunjukkan demo 3W (Wash, Wear & Warn) kepada pelajar.

Idea Baru (Novelty)

- Inovasi pembelajaran topik pencegahan Covid-19 daripada kaedah konvensional kepada interaktif dengan teknologi AR.
- Kandungan maya menunjukkan demo 3W (Wash, Wear & Warn) seolah-olah hologram muncul pada dunia sebenar.

Kreativiti/Inovasi

- Inovasi pembelajaran daripada bahan bercetak statik kepada interaktif dengan teknologi AR.
- Pembelajaran dapat dilakukan dengan mengambil kira norma baharu dalam pendidikan seperti penjarakan fizikal.
- Maklumat yang terhad pada bahan bercetak dapat dimanipulasi dengan pelbagai tambahan maklumat digital dengan AR.

Kebolehlaksanaan (Applicability)

Dengan aplikasi AR3W, pelajar sekolah dalam belajar secara kendiri (personalized) dengan konsep pembelajaran berpusatkan pelajar. Malah inovasi ini menggunakan teknologi yang menjadi trend terkini iaitu Augmented Realiti

(AR) dengan mengambil kira Teori Kognitif Pembelajaran Multimedia dalam pembangunan kandungan pembelajaran. Justeru itu aplikasi ini boleh digunakan dalam strategi pembelajaran seperti pembelajaran teradun (Blended Learning) iaitu campuran pembelajaran konvensional dan menggunakan teknologi.

Impak

Pembelajaran topik pencegahan Covid-19 menggunakan kaedah aplikasi AR3W memberikan impak positif kepada pelajar daripada aspek "Memudahkan", "Berinformasi", "Kefahaman topik", "Memotivasikan", dan "Menarik" (Rujuk dapatan analisa).

Metodologi Kajian

Kajian ini menggunakan kaedah kuantitatif dengan pendekatan berbentuk soal selidik. Penyelidik menggunakan kaedah persampelan bertujuan iaitu memilih sebuah sekolah menengah yang mempunyai Kelas Rancangan Khas (KRK). Sejumlah 35 orang responden telah dipilih. Untuk memastikan data yang diperolehi adalah tepat dengan objektif kajian, responden yang ditetapkan adalah dari pelajar yang pernah menggunakan aplikasi AR3W. Soal selidik diedarkan secara dalam talian kepada pelajar-pelajar selepas menggunakan Aplikasi AR3W. Instrumen kajian yang digunakan adalah soal selidik persepsi pelajar terhadap penggunaan Aplikasi AR3W. Analisis persepsi pelajar terhadap penggunaan aplikasi AR3W menggunakan skala likert 4 mata berdasarkan (Zainudin, et al., 2007).

Dapatan Analisa

Jadual 1 : Analisis Persepsi Pelajar Terhadap Penggunaan Aplikasi AR3W

Persepsi Penggunaan Aplikasi AR3W	Dapatan Analisis		Tahap (Skor Min)
	Min	Median	
Memudahkan saya mendapat maklumat bersifat interaktif Covid-19	3.66	4.00	Tinggi
Membantu saya mendapat maklumat yang berinformasi Covid-19	3.80	4.00	Tinggi
Meningkatkan kefahaman saya berkaitan Covid-19	3.77	4.00	Tinggi
Meningkatkan motivasi saya untuk memahami topik Covid-19	3.51	4.00	Tinggi
Lebih menarik untuk pembelajaran topik Covid-19 berbanding kaedah melalui bahan bercetak	3.80	4.00	Tinggi
Skor Min Keseluruhan	3.71	4.00	Tinggi

Hasil dapatan analisa, item 1, 2, 3, 4, dan 5 bagi perpepsi pelajar menunjukkan skor min adalah tinggi. Ini menunjukkan bahawa aplikasi AR3W sangat berguna di dalam pembelajaran pencegahan topik kesedaran Covid-19 berdasarkan persepsi pelajar. Skor min keseluruhan juga tinggi iaitu 3.71 dan penyelidik melihat persepsi pelajar terhadap penggunaan aplikasi AR3W dalam topik pencegahan topik kesedaran Covid-19 berada di tahap yang sangat baik.

Perbincangan

Secara keseluruhannya perpepsi pelajar terhadap penggunaan Aplikasi AR3W yang dibangunkan berdasarkan Teori Kognitif Pembelajaran Multimedia mendapat respon yang positif iaitu bagi konstruk "Memudahkan saya mendapat maklumat bersifat interaktif Covid-19", "Membantu saya mendapat maklumat yang berinformasi Covid-19", "Meningkatkan kefahaman saya berkaitan Covid-19", "Meningkatkan motivasi saya untuk memahami topik Covid-19" dan "Lebih menarik untuk pembelajaran topik Covid-19 berbanding kaedah melalui bahan bercetak" telah menunjukkan skor min yang tinggi. Ini kerana kelebihan dan manfaat ciri-ciri AR mampu untuk melibatkan pelajar dalam proses pembelajaran dan membantu meningkatkan kemahiran visualisasi mereka. Ciri-ciri ini juga boleh membantu guru menjelaskan dengan baik dan menjadikan pelajar mudah memahami apa yang diajar. Malah Mohd Fadzil, Mohd Nihra Haruzuan, & Noraffandy (2020) menyatakan strategi pembelajaran yang betul dapat mempengaruhi kejayaan dan keberkesanan sokongan teknologi dalam pembelajaran seperti Augmented Realiti (AR).

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Design of Asynchronous Active Learning Class Using Bookend Approach in Moodle Lesson Activity

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Highlights: Asynchronous learning is one of the student-centred learning strategies. This paper describes the design of asynchronous active learning class using bookend approach in Moodle lesson activity. This teaching and learning strategy are implemented in Electronic Circuit and System (ECS) course in one of the engineering faculty at University Teknologi Malaysia (UTM). The bookend end approach is used to design the class, which consist the element of advance organizing, intermittent discussion, mini-lecture, and end with a closure surveying the content of knowledge of the learner. The asynchronous online class was managed in UTM e-learning lesson activity. Most importantly, this lesson activity allows self – directed learning environment for the learner to learn independently. The lecture is based on the pre-recorded video. A hand - on simulation activity was included as one of an active learning activity, and asynchronous interaction for discussion was done using Padlet. The data from the end of the topic survey is answered by the learner at the end of the topic are analysed quantitatively provide the leaner agreement in achieving the learning objectives. In summary, proper design of asynchronous learning with active learning activity is necessary to create a virtual learning atmosphere that will give a positive impact on student content of knowledge and create conditions for the effective learning process.

Key words: Asynchronous learning, informal cooperative learning, bookend approach

Introduction

Online learning has become one of the mediums of conveying the knowledge (Hilts & Turoff, 2005) to the learner since the COVID – 19 pandemics hit the country that has caused disruption to the education system (United Nation. (2020, August). Online learning can be delivered in two way, namely synchronous (Elson, 2014) and asynchronous (Pilar et al.,2017). There are numbers of platform emerge to facilitate the learning such as google meet, Webex, Zoom or Microsoft Teams to cater synchronous learning. The real-time live interaction happen between the learner and instructor made it easier for the design of active or cooperative learning strategy mimicking the one implemented during in-class face to face session. Conversely, asynchronous learning requires the student to study at their own pace without live interaction with the instructor. For this, an electronic management system or e-learning platform can be used (Miguel et al.,2012) which offers several benefits (Violante and Vezzetti, 2015). The delivery of teaching and learning electronically has been demonstrated by Teodor and Adrian, 2018, which have shown to have a positive impact on the student. This is supported by a study by Huang and Zhang, 2017 that have used e-learning in power electronic and shows the impact in terms of knowledge retention and achievement. The asynchronous learning also requires the instructor to plan for an activity that will increase the student engagement, although the learner completes the lesson at their own time and location (Northey, 2015). Therefore, proper crafting of the lesson plan based on the constructive alignment is necessary to include the active learning element. The active and cooperative learning is done through several in a class activity such as jigsaw, think pair share, team-based tournament, and 2 minutes paper. The effective implementation of creating an active learning environment can be done using the bookend division approach (Smith,2005). In this approach, the class session is divided into few segments, namely advance organizer, intermittent discussion, and closure focused discussion. Cultivating the student through active learning is important to produce graduate with an ability to think critically, working collaboratively and other characteristics outlined in the 21st-century skills.

Course Design

The design of the lesson plan following the bookend seems to be much simpler in synchronous learning. However, it also possible to be implemented for asynchronous online leaner. In this paper, UTM e-learning lesson activity is used for managing the asynchronous active learning class using bookend approach to learn about Bipolar Junction Transistor AC analysis. A survey question was posted at the end of the topic, and the data was analyzed quantitatively. The following questions were addressed:

1) How to design asynchronous online class using bookend approach
2) What are the learner perceptions on the content of knowledge when using asynchronous class?

In the next section, the design of asynchronous class using UTM e-learning lesson activity to learn about BJT AC analysis is described in with the detail. The Moodle lesson activity allows for self – directed learning of a new topic. Table 1 shows an example of the design asynchronous class for learning about BJT AC analysis.

Table 1: Mapping of Bookend segment with teaching and learning activities

Bookend Segment	Teaching and Learning Activity
Advance Organizing	The learner listens to the explanation of the learning objectives from instructor voice
Intermittent Discussion	The learner performs hands-on simulation for the learner to stimulate some ideas on the topic before the lecture. Share the outcome in Padlet
Mini Lecture 1	Watch Video Part 1: BJT Low-Frequency Response Analysis
Intermittent Discussion	Asynchronous intermittent interaction in Padlet
Mini Lecture 2	Watch Video Part 2: Drawing Low-Frequency Respond Bode Plot
Assessment	Leaner answering question to test understanding on the video lecture
Closure	The leaner writes the summary on what they have learnt during the lesson

The asynchronous learning class is evaluated by exploring student perception through the end of a topic survey. The data was analyzed quantitatively to evaluate the content of knowledge and learner satisfaction in the learning method. The end of the topic survey consists of the following item as listed in Table 2.

Table 2: Item for End of Topic Survey

Item	Description
A1	The instruction for each sub-topic including the activities are well organize and easy to follow.
A2	I am able to complete the activity and lesson planned according to the time schedule.
A3	Threaded discussions/question post on Padlet were useful.
C1	The hands-on simulation before the video make me understand the topic better
C2	Rate your understanding/knowledge on drawing the BJT AC equivalent circuit at mid, low and high frequency.
C3	Rate your understanding/knowledge to determine the input/output impedance and voltage gain.

Result and Discussion

The result is divided into two parts which are on student perception on the asynchronous online class and on the learner content of knowledge. Figure 1(a) shows the percentage of student agreement on the lesson organize in UTM e-learning. Most of the learner strongly agrees the lesson was well organize and easy to follow. However, 53.85% of the learner is not able to complete the lesson according to the given time, as shown in Figure 1(b). This is because the learner can control the time, particularly when watching the lecture where they need some time for note-taking. In addition, 61.54% of the learner strongly agree that the threaded discussion and question posted in Padlet for asynchronous communication is useful. This is because they can have access on the content at any time.

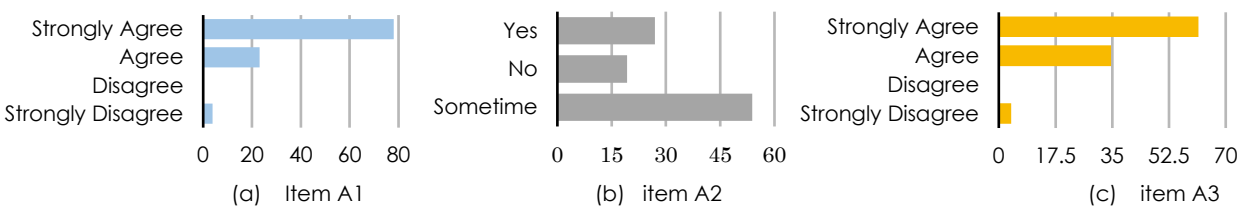

Figure 1: Learner agreement of asynchronous class approach using UTM Moodle lesson

The asynchronous online learning design using the bookend approach has also shown the ability of the leaner to achieve the learning objectives. For example, 73.08% of the learner agree that the hands-on simulation helps them to understand the topic better (Fig. 2(a)). In addition, 53.85% of the learner has excellent knowledge on drawing the BJT AC equivalent circuit indicating (Fig. 2(b)). In terms of the BJT amplifier analysis as displayed in Fig. 2(c), 73.08% and 26.92% agree to have excellent and good knowledge to determine the BJT amplifier input and output impedance as well as calculating the voltage gain.

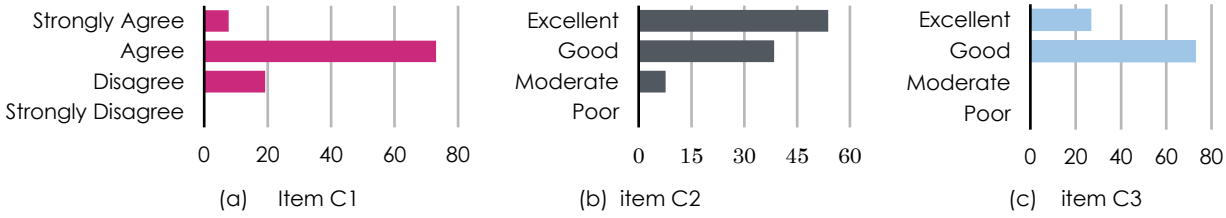

Figure 2: Learner agreement on the content of knowledge

Conclusion

This paper describes the design of asynchronous online class using bookend approach to learn about BJT AC analysis in ECS course. This course involves a circuit analysis that required the learner to use their previous knowledge on circuit theory. The active learning activity using hands-on simulation, video lecture and exercise is organized in UTM e-learning lesson activity. The end of the topic survey indicates student agreement on the lesson organized. The design of the course that include the hands – on simulation, asynchronous interaction in Padlet, video lecture helps the student to achieve the learning objectives. Teaching and learning strategy presented here need further improvement particularly in the design and mapping of the activity following the bookend approach. In summary, the design of asynchronous active learning class must have the characteristic of student-centered learning regardless of the time and location it was accessed by the learner. It is hoped that the learning strategy presented here provide some guidance to an instructor that is using asynchronous learning in their program using UTM e-learning lesson activity.

Acknowledgement

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Recommendations to Increase Instructor's Participation Rate in MOOC

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Highlights: MOOC is a new initiative in education to improve the technological level of Higher Education Institution (HEI), especially the private and public universities. It incorporate lifelong learning, learning technology and simultaneously lead the way for a new path involving teaching methodologies for the undergraduate programmes. However, based on the data collected on the numbers of academic staff compared to the current MOOC instructors in Malaysian public universities, the participation rate is relatively low at just around 3%. Thus, this project aims to address the problem by developing recommendations for universities to increase instructor's participation in MOOC.

Key words: MOOC; Open Learning; Student Centred Learning

Introduction

In Malaysia, MOOC is viewed as a new initiative in education to improve the technological level of Higher Education Institution (HEI). The use of MOOC is supported by the Malaysian Ministry of Education (MOE) as an effort towards realizing 9th shift, "Globalized Online Learning (GOL) in the Malaysia Education Blueprint (Higher Education) (2015-2025). Full participation of all actors particularly from instructors is needed for the success of MOOC. Study by Albelbisi et al. (2018) shows twelve factors associated to the successful MOOC implementation and instructor is one of the crucial factors. Ross et al. (2014) also highlights the importance of recognizing the complexity of instructor experiences and roles in MOOC and how they influence student engagement. But there are currently limited instructor-focused studies that available in the literature.

Figure 1: The 10 shifts in Malaysia Education Blueprint (Higher Education) 2015-2025 (MoE, 2015)

Project Objectives

This project aims to address the problem of low instructors' participation in MOOC. To achieve this, the following three objectives shall be accomplished:

1. To identify factors that influence instructors' participation in MOOC.
2. To develop and validate a model for instructors' participation in MOOC.
3. To develop recommendations for universities to increase instructor's participation in MOOC.

Novelty

The model and recommendations delivered in this project is the main new knowledge contributed towards MOOC studies. The findings had altered and change the current understanding of benefit, cost and contextual factors affecting instructor's participation in MOOC. The model can be patented as it improved the understanding on factors affecting instructor's participation in MOOC. Then, the factors from the model can be made as a module that can be integrated with existing MOOC platform while the most important factors can be used as guidelines for the development of MOOC platform. Finally, the recommendations is outlined to help universities to have understandings on the relationship between these social factors in terms of factors that can be focuses and prioritized to increase the participation of instructors.

Creativity

The first objectives illustrate the need to identify factors that influence instructor's participation in MOOC. To achieve this, a Systematic Literature Review (SLR) had been conducted to find instructor-focused studies in MOOC. Based on the instructor-focused studies, the motivations and challenges of instructors teaching in MOOC had been extracted as the main findings. Motivation and challenges instructors faced in teaching in MOOC can be considered as an important characteristic towards their intention to participate in MOOC. Motivations can be considered as benefits gained while challenges represent the cost faced by instructors teaching in MOOC based on the Social Exchange Theory (SET) perspective. SET proposed that the behaviours of human are related towards getting maximum benefits and minimum cost (Molm, 1997). Consequently, the concepts of benefits and costs in SET can be employed in this study to determine factors that affect instructor's participation in MOOC.

The second objectives illustrate the need to develop and validate the model for instructor's participation in MOOC. SLR had been conducted for instructor-focused studies and identified the previous studies on instructor's participation in MOOC. Based on the findings from SLR, a model is developed that modified and extended the previous adoption model, Unified Theory of Acceptance and Use of Technology (UTAUT) with SET. It is done to directly determine the social benefit and cost factors of instructor's participation in MOOC. The motivations and challenges identified in objective one can be used as benefit and cost factors, and it also can be examined for contextual factors that affect instructor's participation in MOOC.

To validate the developed model, a good instrument needs to be designed, test and analyzed. Instructors in Malaysian public universities were chosen as respondents as they had directly involved in MOOC teaching and the proposed minimum sample size of 114 was determined based on the G*power software. The data in the model is analyzed using SmartPLS software that consists of assessment of measurement and structural model. This will validate the developed model of instructor's participation in MOOC.

For the third objective, the important factors were identified using the Importance-Performance Matrix Analysis (IPMA) in SmartPLS software. This ranks the factors based on the importance-performance map and identified which factors that need to be given attention more due to its importance and performance. Based on the results, the recommendations for universities are developed to increase the instructor's participation in MOOC.

Innovativeness

The innovativeness of the outcome of this project can be seen in the changes and improvements made in the contributions. First, the model developed addressed the gap in the literature. It changes and improves the current understanding of what influence instructors as knowledge contributors in participating in MOOC. Instead of focusing only on the technological factors, social factors had been used as factors because of the nature of instructors that can be seen as knowledge contributors in MOOC. The UTAUT model had been improved with the integration of SET to alter the comprehension of benefit, cost, and contextual factors towards instructor's participation in MOOC.

Second, the findings of the most important factors from the developed model increase the level of significant insights established from factors in the model. This explains the details of the factors in terms of their importance and performance towards affecting instructor's participation in MOOC. The details help improves the assessment of each factor and add more dimensions towards both theoretical contributions on the literature and practical contributions towards MOOC implementation in Malaysian public universities.

Applicability

Aligned with NALI 2020 theme "Future Ready Educators", this project provides an enhancement on the current MOOC from instructor's perspectives to escalate the participation of instructors in an online environment. More importantly, during this global pandemic and unexpected natural disaster, instructors must be prepared to deliver education to students from anytime and anywhere. Instructors gain benefits from MOOC platform to provide students with a new experience of social learning engagement where learners can actively share, collaborate, interact or social with each other. MOOC platform features made it possible for instructors to create, market and deliver word class education by utilizing rich multimedia and interactive widgets.

Impact

Instructors teaching in MOOC are important towards the success of MOOC initiatives as they are responsible to curate, coordinate, construct and create the experience between students and student, student and instructor, student to community, and student and text while performing all this behind a computer screen. Their roles in traditional online courses set the basis for instruction in the MOOC environment. High level of instructor accessibility is important to increase the student engagement in learning (Warren, 2014). Most of the student dissatisfaction in MOOC is caused by the lack of instructor interaction. Further studies suggest instructor participation in discussion forum activities during execution of MOOC activity can actively support students and positively influence their learning outcomes.

Discussion

As MOOC is part of the NALI initiatives of digital resources that contribute towards student centered learning, it is crucial for university to first recognize the factors influencing instructor's participation in MOOC. Our recommendations for MOOC managers are expected to help universities to increase instructor's participation in MOOC. These recommendations are sorted by the most important factors to be addressed to less important factors by using the Importance-Performance Map Analysis (IPMA). It helps the MOOC managers in universities to determine what factors need to be given additional attention first, in order to increase the instructor's participation in MOOC.

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ProCon: Professional Construction Project Manager: Make Sense Education

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Highlights: The main purpose of this programme is to offer an innovative and unique post graduate professional programme that combines academic excellence with competency-based certification. Students are offered a rounded training programme that not only ensures they have sufficient knowledge in construction project management but are equipped with the competency to implement them, as evidenced by CIDB's certification. Surely this is a first in this region, if not the world.

Key words: Innovative; competency, construction; project-based; mentoring

Introduction

The construction industry is complex and uncertain in nature (Alsuliman et al., 2012). Over the last two decades, the built environment has witnessed great development and progressive transformation in terms of use of innovative building materials and modern construction technologies. Due to the urgent need and shortage of project manager who has the appropriate qualifications and experience in Malaysian construction industry. The Construction Project Management professional programme was developed to provide flexible access to post graduate programme to the widest possible audience with the general objective of development Certified Construction Project Manager in Malaysia. This innovative programme is designed to cover wider range of learners and it is accessible by anyone from everywhere as long as they have sufficient work experience in the construction industry.

At the beginning, this programme is offered face to face but the next planning of this program will be implemented in blended learning modes. Hence, this new development that has great potential of increasing the effectiveness of learning among students and industrial practitioners especially in the areas of project planning and project scheduling. There is very little efforts has been undertaken to develop a professional program in cooperation with industry that produces competent construction professionals in Malaysia.

Project-based Learning in Construction

The implementation of this course is based on Project-Based Learning approach (PBL). PBL is an innovative approach to teaching and learning that engages student in rich and authentic learning experiences. In project based learning, all learning activities are anchored to a larger project with real project problems and characteristics (PMBOK, 2000). Students are required to complete the case project provided by UTM and the teaching staff comprising 6 or 7 components of study each semester. The majority of students have more than 5 to 10 years of work experience managing construction projects. In order to support learning process, project-based learning has been implemented by promoting experiential learning and new learning innovation such as site visits, technical seminars and workshop for problem solving (Frutcher, 2003).

Students are assessed using combination of Knowledge Assessment (KA) and Performance Assessment (PA). The aim of the assessment is to judge students against standards commensurate with the requirements of the programme in order to ensure that students reach a level of attainment appropriate for progression, and in the final stage, for the award of the Master degree. Assessments will also provide students with an indication of their strengths and weaknesses across the curriculum and other areas of personal development so that they can improve their performance.

There are two modes of assessment:

- Coursework and assignment presentation - where a course is assessed by coursework and examination, the marks distribution are as follows:

Table 1: Combination of assessment methods

Assessment		**Marks**
Knowledge Assessment (KA)	=	30%
Performance Assessment (PA)	=	50%
Presentation	=	20%
Total	=	100%

- Coursework only – courses such as the Initiation, Handing Over and Project Closed Out and Integrated Master Project are assessed by coursework only where coursework constitutes 100%.

Perceived Benefits

The programme has high marketability because it has an industry accreditation system that requires a Certified Construction Project Manager (CCPM). From industry perspective this programme will help the industry to produce competent construction project managers where the number of Certified Construction Project Managers is very low in the construction industry market in Malaysia. From an academia perspective, this program will help universities expand their professional education and lifelong learning to the potential students in Malaysia and ASEAN countries.

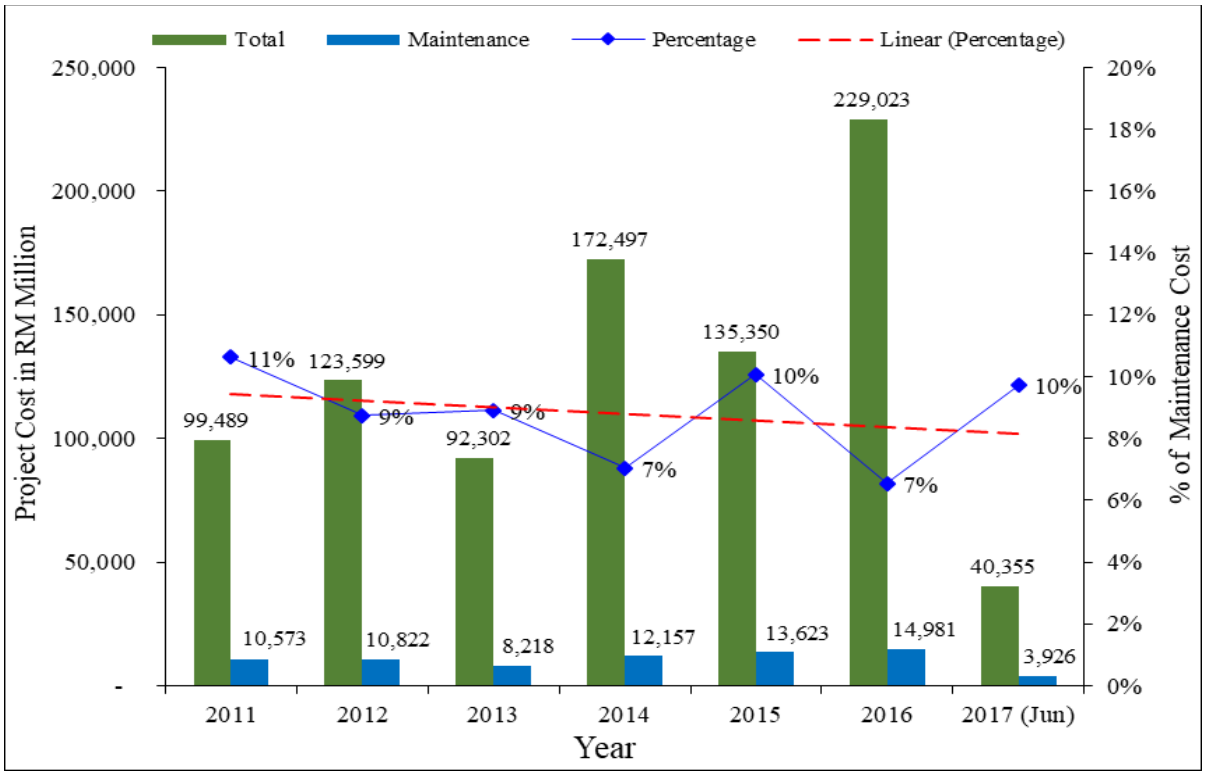

Figure 1: Cost of new projects and maintenance works (CIDB, 2018)

According to CIDB (2018), the cost of new projects and maintenance works in the Malaysian construction market is around RM229 billion in 2016. It is shows that the construction industry needs many competent and professional construction project managers to undertake new construction and maintenance works in Malaysia.

There are several key verifiable impacts recorded in implementing ProCon programme for adult learners and professionals in the construction industry. Programme curriculum were designed based on Project Management Body

of Knowledge (PMBOK) which is a professional development framework developed by Project Management Institute(PMI). The impacts for professional continuous learning by various professionals (Architects, Mechanical Engineers, and Electrical Engineers) in construction industry can be summarized as follows:

- The developed ProCon professional programme is tailored towards project-based pedagogical learning framework. Therefore, teaching and learning methods are suitable for professionals who want to improve their skills and competencies in the field of construction project management.
- Support talent development to fulfil the need and requirements of digital construction (Lekan, 2018).
- Student practice and exhibit higher order thinking skills to solve real problems in the field of work and share experiences through technical seminars and project based learning workshops.

Acknowledgement

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Fun Fun Korean Class: An Engaging K- Language Online Learning Class During The Covid-19 Pandemic

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Highlights: This study investigates the effectiveness of various teaching strategies used to teach Korean language and the motivation of the participants to join a fully online Korean class during the Malaysia COVID-19 Movement Control Order. Watching Korean drama without the reliance on subtitles is among the significant motivating factors that drives the learners to continue learning the language. The instructor's creativity in designing synchronous and asynchronous teaching on online platforms by adopting Korean TV Variety Shows and K-Drama, recorded YouTube videos as Communicative Language Teaching (CLT) approach were found to be very effective in increasing the knowledge, confidence and motivation of the participants to master the language.

Key words: Korean language; Online learning; COVID-19; K-Drama; Communicative Language Teaching (CLT)

Introduction

The COVID-19 pandemic has changed the landscape of education, with a distinctive rise in online learning. When teaching is conducted remotely on online platforms, this ubiquitous learning takes the opportunity of digital content, mobile and embedded computers and wireless of our everyday life (Ogata & Uosaki, 2012). This indicates that opportunities of learning are given to anyone who is motivated to learn. One significant skill that one might want to improve is foreign language because it may create and expand opportunities of oneself in this highly competitive world. Nevertheless, many might not have the opportunities to learn due to time constraints and life commitment. Hence, online learning offers a catalyst that creates solutions and effective methods of educating language learners in leveraging the learning and teaching process.

Project Content

1. Project objectives

Traditionally, the conventional language class has been conducted face to face and run collectively in a classroom. With the COVID-19 pandemic, classes are now fully on virtual platforms hence creating different challenges for both learners and educators. This study looks at both instructor and learner's perspectives on teaching and learning Korean language online. This study investigates the effectiveness of various teaching strategies used to teach Korean language during the nine weeks of Malaysia COVID-19 Movement Control Order. The instructor of the class is a native Korean speaker and participants who joined the class are from various states in Malaysia. Most of the participants do not know each other but they are highly motivated Korean language learners, hence, the study investigates the reasons for their motivation in joining the class and how their motivation has sustained throughout the class. Issues and challenges of using online learning for teaching and learning the foreign language are also investigated.

2. NALI approach implemented in the research

Novelty

Besides the various teaching approaches of the instructor, Fun Fun Korean is special in its novelty of orienting attention and releasing neuromodulators in the brain of the participants hence increased their engagement throughout the nine-weeks online class. The instructor engaged the participants who had diverse backgrounds and experience because she was aware of the motivation of the participants when joining the class and she tapped on their needs. Fun Fun Korean class is also special as the topics covered engaged curiosity and could stimulate activities in the brain's reward regions (Min Jeong et al., 2009). All in all, online learning was the tool to enhance the online learning but the novelty of the class heavily lies on the efforts of the instructor who provided a pleasant and motivating learning

experience to the participant. That explains the reason why all of the participants expressed their motivation to continue joining the class in the future.

Creativity

As the world becomes more complex, human needs to be more creative in meeting its challenges. Gardner (2010), the originator of the theory of Multiple Intelligences, referred to the "creative mind" as a necessary tool for thriving in our rapidly changing and uncertain future. In Fun Fun Korean, creativity is cultivated and praised through the teaching and learning activities. For example, instead of watching Youtube videos passively, the recorded videos prepared by the instructor were meant to assist the participants to do self-learning and to increase their confidence to join the online class. The videos were creatively prepared by the instructor as it includes important vocabularies, phrases and grammatical aspects which were taught in context. Tolerance of ambiguity in learning among the participants was reduced by the instructor she was creative in building a non-threatening learning environment during the online class. As Korean is a foreign language to all the participants, the instructor also assigned tasks that allowed the participants to be creative in their presentations.

Innovativeness

The innovativeness of the Fun Fun Korean Class lies in the use of Korean drama short clips and Korean reality shows that are embedded in all classes. Students were found to appreciate and felt excited when the instructor introduced the K-drama and K-reality shows short clips in the class. It is observed that the students were able to talk more about their favourite celebrities and they were able to talk about their favourite K-drama when the instructor introduced these short clips. The innovativeness of this approach suggests that it encourages and enhances speaking skills among students and break the barriers between the instructor and students in an online language learning class.

Applicability

Fun Fun Korean class is aligned with NALI objectives. The course is designed to ensure that learners undergo meaningful and interactive language learning experience. Hence, the activities, materials and the learning atmosphere are highly focused on helping the students to explore Korean language for meaningful and interactive purposes. It also follows the NALI model in terms of its approach using student-centred learning and blended learning. Specifically, the instructor employed a Communicative Language Teaching approach which is central to the NALI model. Fun Fun Korean class also incorporates active learning strategies and digital learning materials as to help the learners to feel that they are a part of the teaching and learning process and to avoid them feel like they are in a traditional face-to-face lecture.

Impact

Fun Fun Korean Class has significant impacts on students' learning. First, it is impactful to the students as during the online learning sessions, the instructor adopted minimal feedback/response approach when correcting students' mistakes. Here, the students were constantly encouraged not to afraid of making mistakes even though they were seen not confident at first. The instructor made efforts to focus on each student, hence the planned activities and lessons are designed to be student-centred and the instructor acts as the facilitator. The instructor also paid attention to the students' response which includes observing their verbal and non-verbal response especially when the instructor posed impromptu questions to the students.

Secondly, the class provides significant impact on students' learning from the aspect of using meaningful language learning materials. Specifically, the use of Korean drama and Korean variety shows have successfully exposed students on how to use Korean language in daily life instead of learning bookish language. Therefore, Fun Fun Korean class brings significant impact especially on the students' learning experience.

3. Research Methodology

The research instruments used were survey and interview and the data collected determined the impact of the Communicative Language Teaching (CLT) approach utilised on online platform that was embedded with Korean drama elements. The survey was adapted from Hung, (2019) to suit the objective of the study. The instrument was designed with Part A: Demographic, Part B: Reflection and Part C: Evaluation and it was distributed to the participants of the class after the course ended. The participants involved were 10 Malaysian students from different parts of Malaysia. The data were analysed using Microsoft Excel. The interview was conducted with the instructor and selected students to study the effectiveness of various teaching strategies used by the instructors, motivation of the participants and the issues and challenges of conducting the classes as they were conducted fully on an online platform. The interview data were then analysed using thematic analysis.

4. Finding and discussion

Based on the survey, the demographic data suggests that the respondents who enrolled for the class predominantly were female as in an 8:2 ratio and they came from various occupational background such as students, university's lecturers, technical officer and entrepreneur. The analysed data also showed that the respondents came from different age range from 14 to 50 years old and joined the online class from different locations namely Johor, Kuala Lumpur, Sabah and Sarawak in Malaysia. In terms of the learning device, they were identified to using mobile phone, laptop and iPad. some respondents used multiple devices, depending on situation and circumstances, however, the

80 per cent of the participants still prefer to use mobile phones. *Fun Fun Korean* used Webex online platform. Interestingly, the issues of internet connectivity and devices were also found but it was not the 'real' issue. Although some respondents addressed that they had issues with their internet connection, it is still 'acceptable' as long as they truly enjoy and benefit from the class designed by the instructor. The findings also support that the teaching strategies used by the instructor specifically the repetition techniques, using pre-recorded videos, K-drama and Korean TV variety show are believed to be effective in enhancing Korean language learning experience. Initially, emphasis was given on mastering Hangul characters and related vocabularies before the class focused on mastering useful expressions which were taught using a Communicative Language Teaching (CLT) approach. Equally important, positive learner-instructor rapport was developed to ensure pleasant learning experience was created as the classes were fully conducted online. The class was also well managed due to the number of students. The study proves the pedagogical affordability of online learning to enhance the teaching and learning of Korean language to learners of various backgrounds and age groups from different locations.

With the COVID-19 pandemic, classes are now fully on virtual platforms hence creating different challenges for both learners and educators. This study looks at both instructor and learner's perspectives on teaching and learning Korean language online. It provides a good starting point on how to maintain cohesion, and how to nurture creativity and boost motivation when the students are physically distant. The Communicative Language Teaching (CLT) approach used by the Korean instructor for online class effectively fits for learners who are highly motivated in learning Korean language. Since there has been no empirical study documenting the effectiveness of CLT in online Korean language teaching and learning in Malaysia, this study is hoped to be a catalyst in this field. Future research should further develop and confirm these initial findings from this study.

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Embracing Online Teaching through Facebook Live

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Highlights: Due to the worldwide coronavirus outbreak that began in 2019, the education sector has been severely affected. Educators are forced to conjure up new strategies of teaching to ensure that the students obtain the knowledge they deserve. In this study, the aim is to explore an online teaching method, which is through Facebook Live. This study involves 55 first year undergraduate students from Universiti Teknologi Malaysia (UTM) who took a Linear Algebra course. A survey was given to the students for their feedback on the efficiency of this teaching method. The data analysis shows that the majority were satisfied with the method. Hence, we believe that Facebook Live is considered as an efficient way of delivering lessons.

Key words: COVID-19; Facebook live; Virtual classroom

Introduction

In the past decade, various efforts have been made by the government as well as the educators to improve the quality of the students' learning and interaction. The idea of active learning aims to engage students during the learning sessions by being actively involved and reflecting on their works instead of watching and taking notes (Johnson & Johnson, 2008). There are many activities that can be done to implement active learning such as debates, presentations, and games. Traditionally, active learning is done physically. However, it might prove to be interesting to the students to involve the use of virtual applications such as Facebook and YouTube to hone students' creativity.

Recently, COVID-19 has resulted in a decline in effectiveness in performing daily activities, including lectures and other various learning sessions. UNESCO recently stated that half of the student population in the world is forced to be away from school because of this pandemic (Giannini, 2020). Due to campus closures, academic institutions in Malaysia have turned to online systems to continue the education process despite not being sufficiently ready to cope with the entire process (Nassr, 2020). The major concerns are for the students who are influenced by inadequate infrastructure, finance and psychological aspects. The most common problems these entail include poor internet connection and an inconducive learning environment at home.

Aside from that, for educators, online teaching must go beyond simply focusing on delivering the lessons but must also consider how a lesson is delivered and requires feedback from the students. This is because feedback from students shows how they feel, and it influences the teaching method to a large extent (Floden, 2016). With online teaching, various aspects need to be accounted such as time differences, internet access, and learning environment. On top of that, the most accessible platform should be adopted to ensure an ease of access and lower bar of entry for the students to join the lessons. Online conference calls, live streams and recorded lessons have long existed; thus, a variety of options can be taken into consideration.
In this study, Facebook Live is used as the platform of online teaching and the main aspects as stated are examined and explored by conducting surveys at the beginning and at the end of the semester to collect the data from the respondents, which are 55 first year undergraduate students in UTM who took a Linear Algebra course.

Methodology

The sample consists of 55 first year undergraduate students enrolled in a Linear Algebra course. The students are from UTM currently enrolled in the Bachelor of Science in Mathematics programme. In this study, Facebook Live via a private group is chosen as the platform to conduct online teaching. One of the main reasons for choosing Facebook Live is that it is a free platform and easy to access (Johnson *et al*., 2018) and can accommodate much slower internet connections for the students compared to other virtual meeting platforms such as Zoom and Webex. Besides that, the Facebook Live recording can later be saved as a video for future reference. Additionally, real-time comments and replies from students are enabled throughout the Facebook Live session.

Before using Facebook Live as the method of the virtual classroom, a survey was created and distributed to the students to collect their details and also enquire on their internet connection speed at their current location. All students were staying at their hometown so the internet data would be varying from places to places.
During the online teaching, the lecturer conducting the online teaching used the features built into Facebook Live such as comments and reaction buttons to interact with the students. In addition, for cyber security purposes, the Facebook Live was broadcasted in a private Facebook event to ensure that only students from the class were participating.

At the end of each session, a feedback form was given to the students to allow them to share and report their opinions on the effectiveness of online teaching through this platform.

Results and Discussions

A survey was sent to the students after each session to observe their views on using Facebook Live as the virtual classroom. The results showed that nearly 31% of students used their smartphones during the sessions. Since not all students have a personal computer (PC) or laptop at home, the image they view is more limited compared to those using a laptop or dedicated monitor.

The students were also asked to test their internet speed at *fast.com*. The results show that 14% of students are in the low speed category (less than 500Kbps), another 14% are in the middle speed category (501Kbps to 1Mbps), while the rest of the students had decent to excellent internet connections (greater than 1Mbps).

The students were also asked of their opinions with regards to whether Facebook Live is a suitable online teaching method. Two out of 55 students disagreed with this statement. Both students thought that Facebook Live's drawback was that it was difficult to communicate and interact with the lecturer since they can only use the chat features to ask questions. Everyone else agreed that Facebook Live is a suitable method. This is because they can always rewatch the recording if they had problems with internet connection during the lessons. And since Facebook Live accommodates for poor internet connection, the absence of persisting lag and a consistently clear image meant that the students were able to view the lecturer's notes and hear the lecturer clearly. A few students also stated that by using Facebook Live, they are not being distracted by other participants who forget to mute their microphones. Moreover, Facebook Live does not consume a significant amount of mobile data.

In short, approximately 96% of the students agreed that Facebook Live is a suitable method for online teaching. They enjoyed learning through this virtual method, which is one of the alternatives to face-to-face classes. Therefore, Facebook Live can indeed be conducted as one of the teaching methods for universities.

Conclusion

In embracing virtual applications as one a medium for teaching and learning, it is important to create an effective and engaging environment for the students by keeping student-lecturer conversation open. Though physical classes are suspended for the time being, active learning should still be maintained. Afterwards, the experience and feedback from students are needed so that a high quality of education can be achieved. Through this study, students' opinions were thoroughly considered to decide on the efficiency of Facebook Live as an online learning method. It is concluded that Facebook Live is indeed an efficient way of online teaching.

Acknowledgement

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Continuous Improved Process of Outcome Based Education Implementation: Psychomotor Learning Activities

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Highlights: Aquatic Sports course where the teaching is physical in nature was heavily affected by the Covid-19 pandemic. Students were not allowed to be in the pool yet need to complete the course using online approach. Alternative teaching methods and assessments were crafted to achieve learning outcomes especially on psychomotor domain. Analytic rubric for psychomotor assessment was modified according to continuous quality improvement (CQI) in outcomes based education (OBE) to produce new holistic rubric, which is appropriate to the given situation. Effected students were found to have lower percentage of A+, A and C+ compared to previous students. Similar pattern of achievement was recorded but differs significantly to previous achievement. The result indicates that current students are able to achieve the target in psychomotor domain via good alternative activities using new holistic rubric.

Key words: Psychomotor; Continuous Quality Improvement (CQI); Outcome based Education (OBE); Aquatic sports

Introduction (Project or Innovation)

Pandemic Covid-19 has struck the world and has affected many countries including Malaysia. Education institutions are not excluded and with the end of the academic year fast approaching, several questions arose and one of them is: how students want to finish their curriculum as institution closures are prolonged? As in UTM, the Aquatic Sports course has taken its toll due to this pandemic Covid-19. Course learning outcomes planned were to ensure that students are able to apply skills and techniques in aquatic sport and synthesize water activities. The methods were through face-to-face demonstration, practical skills, and group projects while the assessments were through skills tests and group competition inside the water. Since students are not allowed to return to the institution especially into the pool and needed to finish all curriculums online, this course has to take alternative methods and assessments to ensure that the original planned learning outcomes achieved in a respected manner.

The continuous quality improvement (CQI) process has been implemented to revised methods and assessments for psychomotor activities in the Aquatic Sports subject. According to Brookhart (2018); Jönsson & Prins (2019) and Panadero & Broadbent (2018), rubrics are powerful tools for instruction and learning, and for this course, an analytic rubric was used as the assessment tools and it was not relevant anymore due to the students' physical absence. Thus, a newly innovative holistic rubric that consists of students' overall achievement on an activity or item based on predefined achievement levels was innovated to replace the existing analytic rubric. This newly innovated holistic rubric is expected to obtained same outcomes planned at the beginning of semester.

Content (Project or Innovation)

The objective of this study is to discuss the continuous quality improvement (CQI) process of transition and adapting the revised methods and assessments for psychomotor activities in Aquatic Sports subject according to the outcome based learning (OBE) approach. Throughout the process, the former analytic rubric for assessment of the psychomotor domain was revised and modified into a newly innovated holistic rubric. The new holistic rubric was used to obtained same course learning objectives as planned at the beginning of semester while the method of assesment was revised

and changed from physical skill test to simulation of skill-based learning via recorded activities with creativity using technology and online platform.

Holistic rubrics highlighted the use of lecturers to judge performance assessment. The rubric includes a comprehensive assessment of the multi-characteristic of the tasks done and are based on the overall judgement of the lecturers who observe. Since performance is a complex combination of several criteria in psychomotor, the use of expert holistic rubrics is recognized as a useful evaluation method (Slater & Boulet, 2001). Figure 1 illustrated the whole CQI process in attaining OBE approach before and after the innovation of the new rubric.

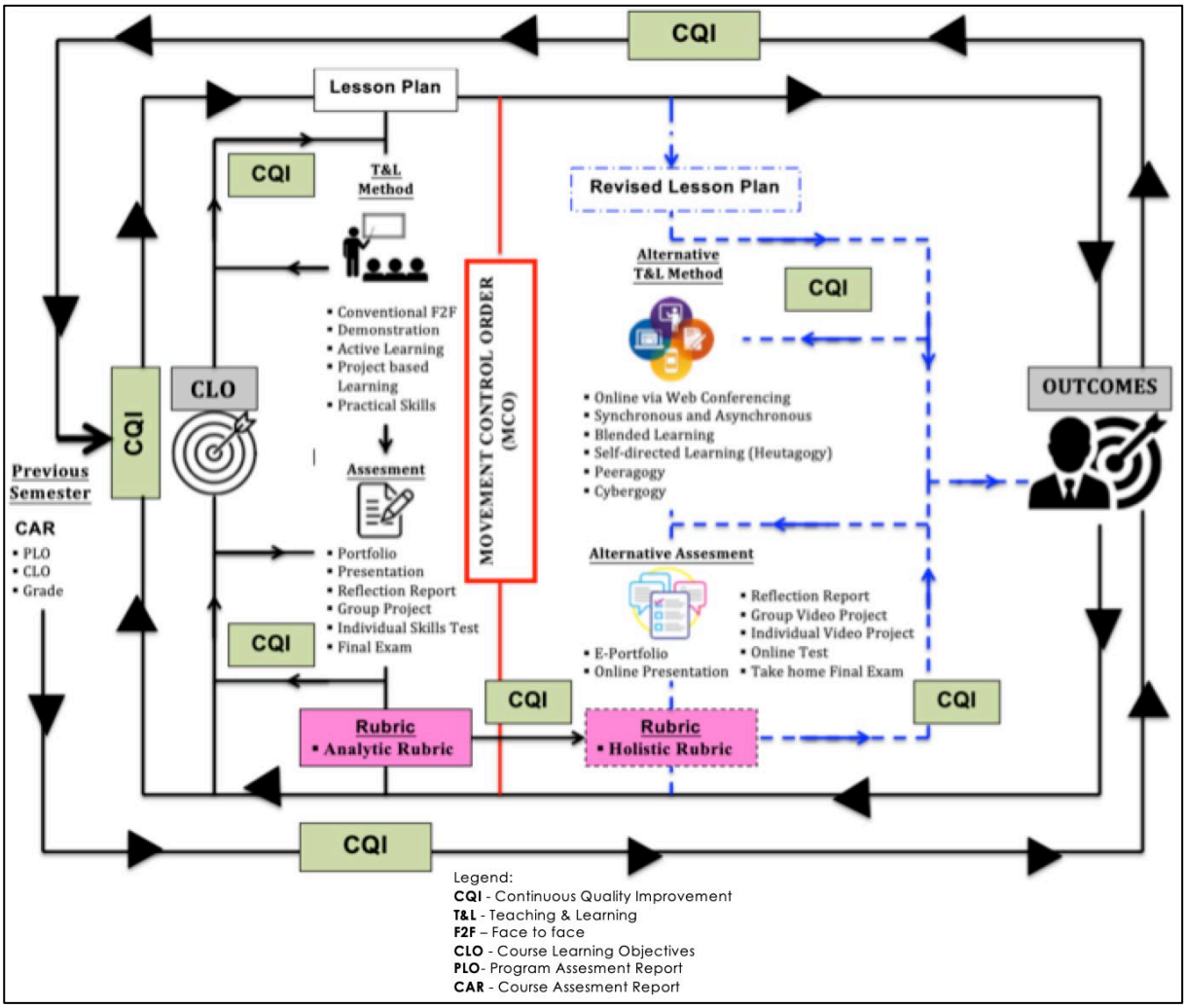

Figure 1: CQI process in attaining outcomes based learning (OBE) approach before and after the innovation of the rubrics.

Due to the limitations of situation, the existing task-specific rubrics cannot be used and has been proposed to the global rating scale. A global rating scale is a holistic rubric that provides a single score based on an overall performance of a student. Holistic rubrics can use behaviorally anchored scales or Likert scales. A global rating scale can be readily used to set standards for performance (Hodges & McIlroy, 2003). However, to use the global rating scale, it is necessary to clearly present pre-determined criteria, such as rubrics, to assess learners' achievements. In this respect, the existing analytic rubrics were used together as it consists original task-specific checklist for psychomotor assesment. A whole CQI process has been implemented throughout the semester before and after the changes especially for teaching and learning methods and assesments. Student's results were recorded at the end of the semester and been compared with the previous semester's results to seek for the effectiveness of the CQI process and revised methods and assessments.

Table 1 is the comparison results between previous and current semester of grade percentage performance of the students. Result shown that eventhough current students has achieved lesser A+ and A grade percentage compared to previous students but the C+ grade achiever also decreasing. The percentage of achievement has similar pattern but was differs significantly compared to previous achievement.

Table 1: Comparison performance between previous semester and current semester of grade percentage

GRADE	A+	A	A-	B+	B	B-	C+	C	C-
PREVIOUS SEMESTER(%)	12	53	12	7	7	0	9	0	0
CURRENT SEMESTER(%)	0	37	20	24	6	12	2	0	0

Results indicate that after thorough process of CQI along the semester, current students are able to perform good psychomotor activities similar with previous students. Eventhough the number of high achiever percentage is decreasing but it also reducing the lower achiever percentage which still allign with the course learning outcomes (which are to ensure students be able to apply skills and techniques in aquatic sport and synthesize water activities).

Thus, the combination of newly innovate holistic rubric and existing analytic rubrics are efficient and a success to achieved desired outcomes. This to enhance that by using alternative methods and newly innovated assessment tool, same course learning outcomes can be achieved. Holistic rubric can better explain task-specific checklist scores compared to analytic rubrics (Yune, Lee, Im, Kam, & Baek, 2018). Suskie (2017) also stated that the use of holistic or analytic approaches to determine performance were up to the practitioners as optional as there was not enough clear rationale to differentiate it purposes.

Therefore, it can be concluded that the CQI process of OBE that been implemented to derived newly innovative holistic rubric for psychomotor learning activities have an overall positive effect on student learning and development as it provide students with many opportunities to be creative and innovative to search for alternative activities to be executed to obtained the same original planned course learning objectives.

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Virtual Gallery Walks to Enhance Students' Competency In Spectra Analysis

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Highlights: Gallery walk is an active learning technique carried out in the classroom, where students are encouraged to develop their knowledge on a particular content or concept, in order to promote higher-order learning, engagement and cooperative learning. This approach can be applied online, particularly the conceptual framework, by utilising technology resources. In this work, it is shown that interactive teaching methods and teaching materials are used to help students gain a complete understanding of the abstract concepts involved in Infrared spectroscopy.

Key words: gallery walk; infrared spectroscopy; cooperative learning

Introduction

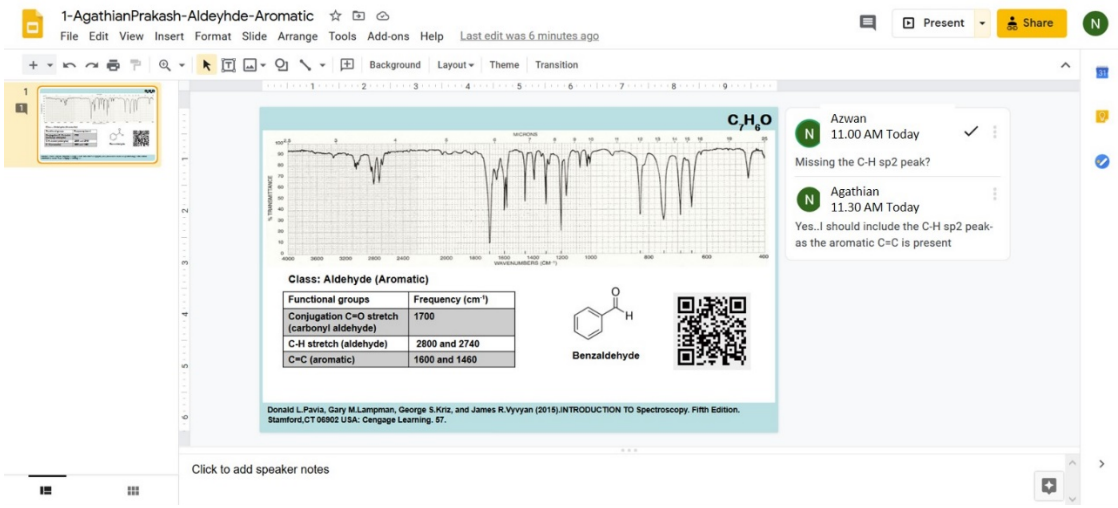
Gallery walk is one of a teaching strategy used by educators to allow students to share their work with peers and to examine learning materials in the classroom. In line with COVID-19 pandemic situation, in order to continue to incorporate knowledge, the virtual gallery walk approach has been integrated in the learning of organic compounds functional group and their characteristic absorption frequencies in infrared (IR) spectroscopy. The method was introduced to first year Undergraduate Chemical Engineering students, Universiti Teknologi Malaysia. Following the Jigsaw classroom strategy, students are divided into small groups that require students to be dependent on each other to ensure their learning. A collection of IR cards comprising all spectra from different groups of compounds was given to each group. Based on the information presented in the IR Cards, students need to solve the spectrum that relates to their compound structure.

Students' misconceptions in the interpretation of IR has become a major concern as it influences how students learn new scientific knowledge when acquiring correct body of knowledge. *It becomes even more challenging when* students from engineering background are required to understand this concept, as their basic knowledge in fundamental chemistry is not in depth. Difficulties emerge when students need to understand the rationalisation of different vibrational frequencies, as more attention and help are necessary in this situation.

Content

Implementation of this approach involves innovative teaching strategies that can improve students' engagement through hands-on activities and collaborative discussion with peers, albeit using an online platform. The cooperative learning activities were designed based on the modification of the gallery walk approach. In this strategy, small groups of students work individually on components of a larger topic or problem and then later synthesize their collective knowledge. This method requires individual responsibility while also promoting group understanding of a larger topic. In a typical activity, each student was tasked with analysing a small feature of an IR spectrum using their interpretation to contribute to an overall group assessment of the posted spectrum, leading to the elucidation of the molecular structure (Figure 1).

Figure 1: Example of IR card with QRcode



In total, sixty IR spectra have been posted to Google Drive and students were required to use Google Slides to open the files. Students need to scan the QRcode linked to the video explanation of how the solution was presented. Each student uses the comment button that signifies the digital sticky notes to leave constructive feedback of their peers' work. Students may return to their own work to view comments and respond to the remarks. During the process, the lecturer not only observes the students' answers, but also makes an acceptable endorsement to enhance the fundamental knowledge of the students, before evaluating the assessment. Towards the end, a complete set of spectra from different class of compounds were combined and posted in the Google Drive. Students who faced difficulties in understanding the way to interpret the IR spectra can refer to the IR card at any time using the link that has been tied to the gallery. This approach allows for accessible tasks, while still providing a complex learning environment without overwhelming the students.

The impact of jigsaw classroom and virtual gallery walk strategies were evaluated by analyzing students' satisfaction and learning improvements. An analysis of the feedback indicated that the activities can be used as an enhancement tool to better assist students in comprehending the content. During the group discussion, the practice of Jigsaw method has enriched the knowledge exchanges among the students, which significantly enhanced students' understanding. In specific, the students underwent the process of self-constructing the knowledge among the group members.

Furthermore, the results suggested that the students appreciated the activity, as it provided in-depth coverage of the given topic. In the topic, students have to reason the observed peaks in the IR spectrum based on the bond vibrations. Students also need to connect the appearance of the peaks based on the IR regions. Additionally, the multiple functional groups present in any given organic compounds might provide certain difficulties in determining the final structure of the compounds. Thus, the activity was designed as such that prior to group discussions, the students must be accustomed with the designated organic compound and able to relate with the basic principle in IR. This will ensure the later cooperative-learning process to be effectively delivered. This method also enabled them to focus on the assigned topic, considering their time constraint for self-learning of the overall content. At the later stage, the students gained the required knowledge via input provided from their group members through the strategy of the implementation of virtual gallery walk.

The students also agreed that this approach encouraged virtual active participation. This is because the organized activities provided multiple opportunities for them to engage the content in providing necessary solutions. Initially, the students are responsible to mastering their own assigned compound. Afterwards, each of them must contribute to the learning process among peers to complete the overall assignments. Each of the members have to complete the compound puzzle by identifying the appropriate functional groups and matched with correlation chart to assign the band adsorption. Thus, the students were given opportunity to engage with their group members instead of solely relying on their lecturer. The success of this strategy can be seen by the comparison of students' achievement from three different cohort on CLO3 from the course information as shown in Table 1.

Table 1: Comparison of CLO3 achievement between students from three (3) academic sessions

CLO3 Achievement	Session		
	17/18	18/19	19/20
Utilize infrared spectroscopy technique for characterisation of organic compounds.	58.2%	63.6%	74.0%

These teaching strategies encourage students to use their imagination to dig deeper when engaging in the content of the lesson. The students are actively involved with the learning and can work with their peers in collaborative groups to showcase their learning. Topics in infrared are divided to carbonyl and non-carbonyl functionalities, as this is the substantial highlight in infrared spectra interpretation. Student data sheet is used as instrument of assessment to evaluate the level of student understanding and misconceptions. Feedback on the chosen teaching strategies will also be documented as reference for continual quality improvement (CQI) purposes.

Students have been effectively engaged with the assistance of peers and lecturer in the process of developing new knowledge and understanding of the concepts. The feedback from students was generally constructive and reflected the effectiveness of simplified teaching material, particularly the implementation of virtual gallery walk approach in the interpretation of infrared spectra. This method also contributed to the improvement of students' grade and inculcated the team working value via cooperative learning. Gallery walk and other similar strategies that empower students to contribute ideas could be transformed along with varied teaching strategies and learning settings to implement effective learning for sustainable development education.

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Behaviour Modification Approach and My Problematic Behaviour: Problem Based Learning Framework

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Highlight: Students are given the opportunities to apply PBL in Behaviour Modification class. It is a core course for psychology students. Students are required to solve a real problematic behaviour. Traditionally in Behaviour Modification class, students will only be exposed to the procedure and tested on their comprehension during the final exam. Traditional way shows that the solution of human problem ends on a piece of paper. However, PBL provides a new learning method for behaviour modification. For behaviour modification course, students are required to find solution for a real case. There are two methods in measuring students' understanding of problem solution in behaviour modification. The first assignment is more towards short-term activities whereas second assignment is a long-term activity and involves experiment. For the first assignment, students are required to solve a problem in e-learning. They need to come up with a solution for the case given using the behaviour modification procedures. Second assignment is an experimental project. The experimental project requires students to work in group to solve a real problematic behaviour.

Key words **:** behaviour modification ;Experiment : Problem Solving ; Effective Group Role,

Introduction

Behaviour Modification is a core course for Bachelor of Psychology with Human Resource Development (SHAY) and Bachelor of Science (Human Resource Development). The code for this subject is SHAY 3043. This course aims to expose students with behaviour modification procedures to treat problematic behaviour. The methods of measuring students' learning are often characterized by formative and summative assessments. Basically for formative assessment, students are measured through test, quiz, cooperative learning activities, assignment and presentation. The main assignment for behavior modification course is experiment to eliminate problematic behavior. In the experiment, students are required to use their own problematic behaviour as the unit of analysis. Therefore, students need to conduct the experiment by using behavior modification procedures to eliminate undesired behavior. The data need to be attached to prove the changing process. Despite experiment being the main assignment, students are still required to complete weekly task in the classroom or e-learning. Exposure on the treatment methods helps students to apply specific procedures to solve behaviour issues. In order to enhance the students' knowledge, lecturer will upload a case study and forum in the e-learning platform. Students need to answer the case study and forum by giving the correct procedure. This course is equipped with Problem-Based Learning (PBL). PBL is a Student-Centered Learning (SCL) approach that enables learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to solve a problem. The main goal of PBL is for students to creatively and collaboratively solve a problem (Alias & Aris, 2016). PBL prepares students on how to conduct, solve and report their assignment systematically.

CONTENT of PROJECT

Project Objectives.

In behaviour modification experiment, students are required to solve their own problematic behaviour. They need to do it in a group. Each member has their specific role. They must solve the real problematic behaviour. These students have to measure the changes of problematic behaviour after the treatment and procedure given. The procedure for conducting the experiment are : students form a group. Students choose the group members in class, students need to choose one main problematic behaviour. Usually, the problem comes from one of the group members which is voluntary basis. The problematic behaviour must be agreed by the team members, the problematic behaviour must be overt and easy to be measured such as eating behaviour (increase the frequency of drinking mineral water, decrease sugar intake and time management and study skill. Students are compulsory to set a target of a new

behaviour and the group members will be given a specific role to avoid free rider in the experiment. The roles are as patient (person who living with problematic behaviour), therapist (person who gives the treatment), observer and data keeper (person who always observe on the patient's achievement and prepare record). Students need to present the weekly outcome of the experiment to the lecturer.

Despite experimental project, students are required to solve a problem in e-learning. They need to come up with a solution for the case given using the behaviour modification procedures. This activity can be considered as constructive and self-directed activity.

This present project aims for three research objectives:

i. to apply problem based learning (PBL) in teaching method
ii. to increase students' performance
iii. to expose students with PBL as new learning method

Novelty

1. Previously, I have employed traditional teaching method for my class. I started teaching this course in semester 1, session 2017/2018. However, it was disappointing when the KPI for this course was < 0.65. Therefore, I was thinking for something new. In 2016, I attended a course on PBL, hence I decided to apply it as my teaching method. I changed my role to a moderator in order to facilitate my students.
2. Assign students with specific role to avoid free rider. Students need to work on specific role.
3. Behaviour modification is highly correlated with individual assignment. However, I have changed it to group assignment. Team members are assigned with specific role, therefore they can do their own role. This can avoid free rider in the assignment.
4. Long term PBL. The experimental project takes 10 weeks. Most of PBL activity involve in short term problem solving activity (Carrió et al., 2016). However, for this project students given two assignments which were case study (short term) and experimental project (long term).

Innovativeness

1. Student will change to a new behaviour. Students gain problem solving skill and lifelong learning.
2. Students will come up with the module of treatment and good procedure to treat a specific problematic behaviour. For example: Treatment and behaviour Modification Procedure to eliminate sugar intake. This module would be good and useful for diabetic patients.

Applicability

There are two (2) assignments relevant to Problem-Based Learning. The first one is problem-solving exercise that has to be completed within one week. For second assignment, students are given 10 weeks to complete an experiment. Students' role and motivation is the first aspect of PBL applied in this course. Both assignments have to be completed in group. They must work in a team to solve the problematic behaviour. For the second assignment (experiment), each member has their own role and responsibilities. Cooperative teamwork skill and motivation to solve the real problem are related to problem-based learning. The solution of the problem is part of PBL link to this course. They need to apply treatment and procedure as the solution to problematic behaviour. Human Problem is a main thing in this course. In problem-solving exercises, students are assumed to have the knowledge and skill on specific procedure of behaviour modification. The problem-solving exercise requires students to present the solution in front of the class.

The changing role of lecturer from instructor to coach is another part of PBL in this class. The lecturer does not only teach but also becomes the moderator to guide the students. Students will present their experiment progress to the lecturer week by week. Lecturer stimulates students with clues to enable the students to give the correct procedure of behaviour modification. Lecturer does not give the answer but students will. The solution will be useful for people with similar problem. It will be the guideline on the treatment and procedure to solve the problem. In the future, some of the students will become a psychologist and will consult their patient or client with similar problem. At least, they will remember some treatment that they have experienced in behaviour modification class. Therefore, this course will prepare them for their future career.

Impacts

1. Result on Programme Learning Outcome 1 (PLO 1). PLO 1 has increased from 63.08 (Semester 1) to 73.50 (Semester 11)
2. Focused on long-term knowledge. Helping people with problematic behaviour is a good thing for students who graduated in the field of Psychology. The course prepares students with creative thinking in giving treatment, ethic in dealing with human and the right procedure to solve problematic behaviour.

Research Methodology

This study research design used the experimental and cross sectional design. There are two data collected in this present project: the first comes from case study and second data is experimental project. The first data only uses cross sectional data whereas second data uses experimental data. The data obtained from students' performance. This study has employed only on intervention, pretest and post test data (experimental project). The pretest and post test data obtained from students' assignments (case study, experiment and PLO 1) on semester 1 session 20192020 and semester 11 session 20182019.

Procedure of Research Design

This project has employed experimental design. The experimental design only for the experimental project (second assignment). The experimental project students need to design their own treatment and procedure. Therefore, students should be creative in designing intervention but must be specific in conducting procedure. Therefore, students need to read and understand all the procedures thoroughly. They need to discuss with the team members in order to give good procedure to solve the problematic behaviour. This situation is concurrent with the philosophy of PBL that learning can be considered as constructive, self-directed and specific (Yew & Goh, 2016). Solving a problematic behaviour means changing a human to a new positive behaviour. The process is not easy and takes time. Therefore, PBL in this course involves experimental as a long-term activity. By using PBL in long term activity able to develop lifelong learning and problem solving skill (Carrió et al., 2016). Students stimulate the ability to analyse (cognitive), use technical and generic skill to solve the problematic behaviour from the baseline until the end of the experiment. It takes 10 weeks to complete the experiment.

Finding And Discussion

This study only used mean for the case study and experiment marks, and KPI from programme learning outcome 1 (knowledge). The result as in Table 1.

Table 1: Comparison Mean for Case Study, Experiment and Programme Learning Outcome 1(PLO1)

Domain	Semester 11 2018/2019	Semester 1 2019/2020	Semester 11 2019/2020
	Mean	*Mean*	*Mean*
Case study	*6.4*	*6.0*	*8.0*
Experiment	*16*	*15*	*18*
PLO 1	*66.83*	*63.08*	*73.50*

The result from table 1 showed that PBL able to support behaviour modification class. Most of the behaviour modification classes only focus on individual assignment (Martha, 2020). Once I have implemented PBL as framework to group assignment, it has increased the students' performance.

Commercialization Potential

Students will come up with the module of treatment and good procedure to treat a specific problematic behaviour. Most of the behaviour modification applied in clinical psychology class. However, the outcomes not only for psychologist but also benefit to counsellor, Allied Health Practitioner such as speech therapist, occupational therapist in helping them deal with their patient.

One of the potential commercialization project is develop a module on treatment and behaviour modification procedure to treat problematic behaviour. The module will be used as guideline. The module will help psychologist, counsellor, behaviour therapist in dealing with their patients.

Conclusion

Dealing with human problem is a core job of psychologist. Students have an opportunity and experience to develop fluid intelligence ability in dealing with human problems in behaviour modification class. Students will become a psychologist and will consult their patient or client with similar problem. At least, they will remember some treatment that they have experienced in behaviour modification class. Therefore, this course will prepare them for their future career.

Acknowledgement

I would like to express my sincere gratitude and appreciation to all my students in behaviour modification class, my team, UTM LEAD for organising this project and NALI 2020 committees.

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The Power of Avengers in Chemical Process Design Heuristics

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Highlights: Chemical Process Design Heuristics requires students to be able to scrutinize, distribute, and analyse chemical reactions through the selection and positioning of processing operations. As the students will deal with hazardous and toxic chemicals, failing to apply the Process Design Heuristics theory will often lead to perilous situations. This study highlighted the approach used by the instructors to meet the learning outcomes by infusing the cooperative learning approach with modified jigsaw teaching strategy known as Hero & Avengers Training Centre concept. By applying the Gagne's model of instructional design, the class setting were revised to stimuli and focuses on the learning outcomes. Findings from the students' reflections proved that this approach stimulated and activated students' cognitive skills and enhanced their soft skills.

Key words: Process Design Heuristics, Hero & Avengers Training Centre, Cooperative Learning, Instructional Design, Active Learning

Introduction

Education is the key driver of human revolution. Hence, education has to undergo phases of reform and transformation to meet the global challenges. Regardless of the effort invested by the educational sector, industry still complained about the competency and skills among engineering graduates (Weinberg, 2020). The report released by the World Economic Forum 2020 (WEF, 2020) highlighted among the top 10 skills needed by employers from their workers in 2025 are critical thinking, analytical thinking, creativity, complex problem solving, leadership, social influence and flexibility. In order to meet with the required skills, it certainly urged instructors to redesign course activities that can engage and activate the students' cognition along with motor skill and attitude. It is essential for the instructors to ensure that the course learning outcomes can be achieved and applied beyond the classroom especially in courses that are essential and critical to be applied in their 'risky' workplace setting. By integrating the instructors' reflection on the Continual Quality Improvement as extracted from the Outcome Based Education System of UTM, the instructors believed that to improve the teaching and learning for the benefits of both parties, it must start with the instructors. Hence, the instructors enrolled in educational training courses such as Rigorous Research in STEM and Engineering Education Research Course organized by Centre for Engineering Education (CEE) UTM. Through the attended courses, the instructors were able to explore and gain educational inputs to enrich the teaching and learning activities.

Chemical Process Design Course

Process design is essential knowledge for all chemical engineering students. The final year students enrolled in the SMJC 4343 Chemical Process Design course, learned process design knowledge through project-based learning using their Capstone Design Project. The Instructors provided scaffolding to the students through active learning for developing the students' technical knowledge and soft skills. One of the 'most challenging' topics as claimed by the students in this course is Chemical Process Design Heuristics. This topic is among the root topic for the students in delivering their Capstone Design Project. Upon the module completion, the students were expected to design a new process that obeys the heuristics and delivers a feasible Process Flow Diagram (PFD). However, the students find it difficult to imagine the rules mentioned in the heuristics, due to the lack of exposure to chemical processes. In addition, the topic is very lengthy and take more than 20 pages in the textbook, which could be very boring too. Without good examples, the students were only able to memorise the heuristics.

Continue or Break The Chain

Since, Gagne's theory highlighted on the importance of having clear learning objectives in order to construct a learning hierarchy, the instructor has decided that the learning objectives for this topic required the students to synthesis process / separation system selection decision using heuristics. In order to enhance the students' learning experience, the course activities were designed using jigsaw technique, which is a teaching strategy of organizing student group work that helps students collaborate and rely on one another through cooperative learning. This teaching strategy is effective for accomplishing multiple tasks at once and for giving students a greater sense of individual responsibility. By taking into account that the generation Z that are fast, prefer visuals, comfortable with social networks, and into the trends- hence the Hero & Avengers Training Centre concept were infused in the jigsaw technique. A very important task is added in the jigsaw technique, where the students were provided with several PFD files from their seniors, they are able to learn from mistakes in the process designed by their seniors. The sessions were divided into two, where the first session includes Step 1 to Step 2, while the second session includes Step 3 to Step 5 as described in the following.

STEP 1: Introduction

The objectives of the lesson were to inform the students for explaining process design heuristics and evaluating designed processes. The instructors greeted the students and allowed the students to do shout out on their problem in their capstone design project. The instructors summarised the student problems during the project implementation and related to the subject matter of the class. The students would feel that the instructors understood their problems, which enhanced their interest in the class. Then, the students were briefed about the activity.

STEP 2: Hero Training Center

Hero Training Centres (Expert teams) were formed by having representatives from all the Avengers Teams (Home teams). The Hero Training Centres were given specific Process Design Heuristics and Process Flow Diagram (from the senior's Capstone Design Projects).

First, to enhance individual accountability, the heroes were required to read the heuristics textbook individually and jot down important points. The Hero Training Centres were required to prepare presentation notes based on the heuristics material assigned. The Training Centres were also required to perform line tracing on the seniors' Process Flow Diagram and find relevant good and bad examples according to their assigned heuristics. The experts were expected to deliver presentations using posters. In order to ensure effective learning happened, this learning process was done in the classroom to ensure all the expert teams were able to seek for technical supports and advises from the course instructors. The instructor takes the opportunities for give confidence to the students by agreeing student's thinking and correct them when necessary.

In the second session, the experts were given 15 minutes to do a quick revision in their Hero Training Centres for enhancing individual accountability.

STEP 3: Avengers Assemble

The Heroes (Experts) returned to their Avengers (home) teams. The Heroes were required to present their Hero Training Centre notes to the team mates via gallery walk. The team mates were encouraged to ask question to the Heroes. The team also looked into various PFD files given to the Hero team. Most students were expected to learn all the heuristics in this session. The teams were aware about the team quiz as the last part of the activity. The instructors went around all the groups, to ensure correct ideas were given, and probed discussions among the team members during this step.

STEP 4: Hero Clinic

Due to the time limit given in Step 3, Avengers (home) teams were given chances to complete the expert presentations, if they had not done so. For some of the teams, they might have some questions and uncertainties, the teams were also allowed to consult other experts to verify their understanding of some specific heuristics. This part allowed them to perform troubleshoots.

STEP 5: Avengers Endgame

Team-based quizzes for the Avengers Teams were conducted via Kahoot. Some questions were picked up from different expert team scopes that were important for the student to perform the project. Top performing teams were rewarded, for giving satisfactory answers to the students. For some questions, the students were picked to explain the concepts behind the questions. The instructors also explained in detail for some questions that may confuse the students.

Findings

After the class, the students' reflections were collected and analysed using thematic analysis. Three themes emerged from the students' reflection, they were Self-realization, Learning process and Soft skills, with respective sub themes. Based on the results as shown in Table 1, by infusing the cooperative learning approach with modified jigsaw technique known as Hero & Avengers Training Centre concept in the course, it has stimulated the students' cognitive skills and shown a positive impact in their soft skills.

Among the highlight from the thematic analysis is the sub theme of responsibilities. Responsibility is a highly valued soft skill that was underrated. The students who failed to take responsibility of their work will be less productive and less successful overall.

Table 1: Thematic analysis of student reflections

Theme	Sub-theme	Excerpt
Self-Realization	Concept of Heuristic	I was thinking that I needed to thoroughly understand the heuristics that were given to my team because **a domino effect will occur if one misunderstands and fails to deliver any of the points** which explains the concept of the heuristic.
		it gave me the right kind of pressure to ensure that I understand the heuristics that were given to my team as clear as possible to ensure that my friends **wouldn't get the wrong concept** of it.
		I able to understand better about the heuristics **through the mistakes made by seniors** in their process flow diagram.
	Seek Expert	What didn't go so well for me was some of the terminologies that were part of the description of the heuristics**. Some required higher level of knowledge** and this required my time to refer to our lecturer
		I was trying to absorb as more as information as I can with my group members during the activity due to **we need to relate process design heuristics when we do project**.
	Self-Improvement	I also encounter some problems where I cannot give the best presentation to my team members**. I can understand the topic I studied but I can't explain it well to my members**. Thus, it made me think that I need to change. I need to work really hard in a fast way, be more prepare and enhance my interpersonal skills **so that I don't do the same mistake again.**
Learning Process	Time efficient	The thing that went well for me was how much faster it was to understand all the heuristics given the short amount of time. This process of learning and teaching was **very time efficient** and
		This was a **very time efficient** activity that not only helped everyone understand the task with clarity but it was also beneficial in the team bonding within classmates.
		It's a whole new experience to conduct this learning way in classroom. This learning activities enable students to understand the heuristics in a **shorter time compared to through normal lecture**.
	Students efforts	**I tried to remember and understand** most of the heuristics presented from other groups.
		During these activities, **we need to understand our part individually and after that explain it to others team members so that we can share our thought together**. Thus, it made learning process become faster.
Soft Skills	Responsibilities	I do think that this activity gave benefits to where I learnt that I need to **work really hard because my team members depends on me** to present them topic that I studied. Thus, **I need to be really well prepared.**
		It is a very well-planned activity. This type of activity is very recommended especially when there are many students involved. This is because **none of the students are left behind and everyone is needed as they have their role.**
	Adaptability	I find that we need to be able to learn, understand fast and interpret in so that we can understand and teach other members too. This is an important skill that can be implement I during work stream.
	Team working	these activities could give positive impacts for us student which made us to be more prepared, **built teamwork** and fast learner.
	Presentation skills	Besides, I **learnt good presenting skills** from other group members that able to convey idea clearly in a short time.
		I was thinking the **simplified method to present the idea** to other group members.

Conclusion

Through the Hero & Avengers Training Centre concept design via Gagne Instructional Design, the course learning outcomes were achieved. The teaching activity through jigsaw cooperative learning strategy managed to improved students learning in chemical engineering. According to the reflections, the teaching and learning activity managed

to alert the students for being able to meet the skills (cooperative, team player, responsible, adaptable and presentation) required by their future employers.

Acknowledgement

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Project-Based Blended Learning Using Padlet

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Highlights: Project-based blended learning is an approach that engages learners in knowledge construction by having them accomplish meaningful projects by combining face to face and online monitoring. In order to fulfil the objective of project-based learning, continuous monitoring and guidance as well as good communication platform between the instructor and the students are needed. Therefore, Padlet platform which is a free online notice board was used as a monitoring and communication platform in conducting a project in Environmental Management course. An analysis on students' perception of blended project-based learning using Padlet platform was conducted. A quantitative research design via questionnaire was carried out among a group of third-year civil engineering students who enrolled in Environmental Management course. It was found that the application of project-based blended learning approach using Padlet platform had improved the communication between the instructor and the students as well as aided the student to complete the project successfully.

Key words: blended learning; continuous monitoring; padlet; project-based learning

Introduction

As the world emphasize on the sustainable principle, environmental management topic becomes an essential element to aid the integration between the economy growth, environmental protection as well as social equity. The future generation of professionals such as engineer must embed good environmental management within their practice as they play vital role in the implementation of sustainability principle. Integration of good environmental management principle can be introduced and highlighted via education at school and university level. In order to nurture good environmental management at university level, it is suggested that the students are provided with the opportunity in real problem-solving and knowledge construction in authentic professional contexts. One possible way to achieve this goal is through project-based learning.

Having theoretical knowledge is vital but the theoretical knowledge without application may not sustain in the long run. Realistic approaches need to be practised to help the student to apply the theoretical knowledge that they obtained in the class. Project-based learning is one of the possible approaches to attain this purpose as project-based learning refers to an inquiry-based instructional method that engages learners in knowledge construction by having them accomplish meaningful projects and develop real-world products (Brundiers & Wiek, 2013; Krajcik & Shin, 2006).

The project-based learning proved to be effective to help student learning experience based on previous literature (Guo *et al.,* 2020; Ricaurte & Viloria, 2020). However, the purpose of project-based learning may not be achieved if the instructor is unable to do proper continuous monitoring. The practice of giving project at the early of semester and only evaluate the project output at the end of semester does not fulfil the purpose of project-based learning. In order to overcome the issue, the instructor needs to identify a good platform to facilitate the continuous monitoring of project-based learning. Therefore, Padlet platform is used for continuous monitoring of project-based learning in Environmental Management course. The usage of Padlet platform also an effort to apply the concept of blended learning that allows educators to integrate elements of traditional face-to-face instruction with tailored online learning.

Project Objectives

The objective of the study is to analyze students' perception on continuous monitoring of project-based learning using Padlet which involves third-year Bachelor of Civil Engineering students of Universiti Teknologi Malaysia that enrolled in Environmental Management course.

Project-Based Blended Learning in Environmental Management Course

Project-based learning is one of assessment considered in Environmental Management course. The purpose of conducting the project is to apply the knowledge that the students acquire in the class in the completion of a project. Furthermore, the project-based learning approach also introduced in this course to nurture the generic skill among the students, especially on team working and communication aspects. In order to ensure the purpose of project-based learning is achieved and the outcome of the project is correctly addressed, an effective and good platform for continuous monitoring is needed. Therefore, the Padlet platform is used to facilitate the communication between the instructor and the students as well as to embed the idea of blended learning in conducting the course. The framework of project-based blended learning approach used in the course is shown in Figure 1.

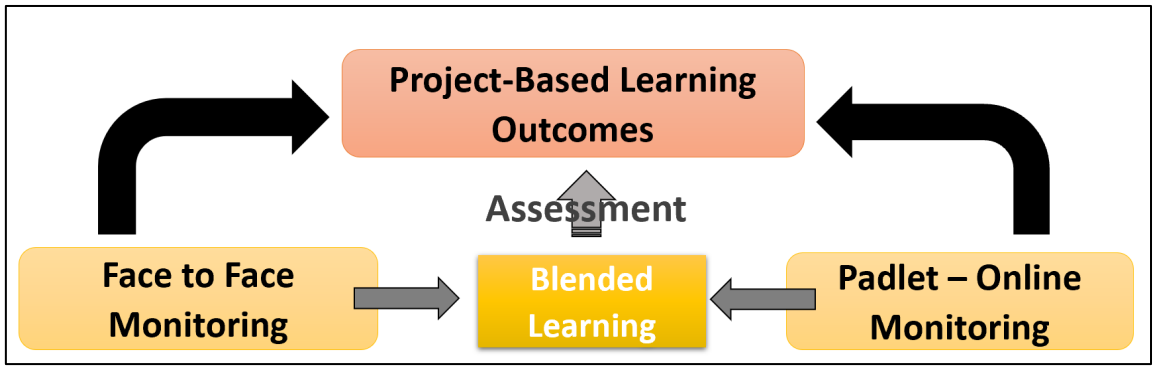

Figure 1: Framework of project-based blended learning in Environmental Management Course

Padlet Online Monitoring

Padlet platform is a free online blank wallboard that can be used by invited participants to collaborate in collecting ideas, brainstorming and sharing information. Padlet can also be described as an online notice board. Padlet can be used by students and teachers to post notes on a common page that can contain links, videos, images and document files. The platform is easy to access and enable the communication between the instructor and the students to run smoothly. Padlet was used as online monitoring platform to aid the students in the completion of the project given in Environmental Management course. The online monitoring was conducted at least three times which are during the selection of project topic, questionnaire design and data analysis stage. Figure 2 shows the Padlet interface of complete online monitoring of the project in Environmental Management course.

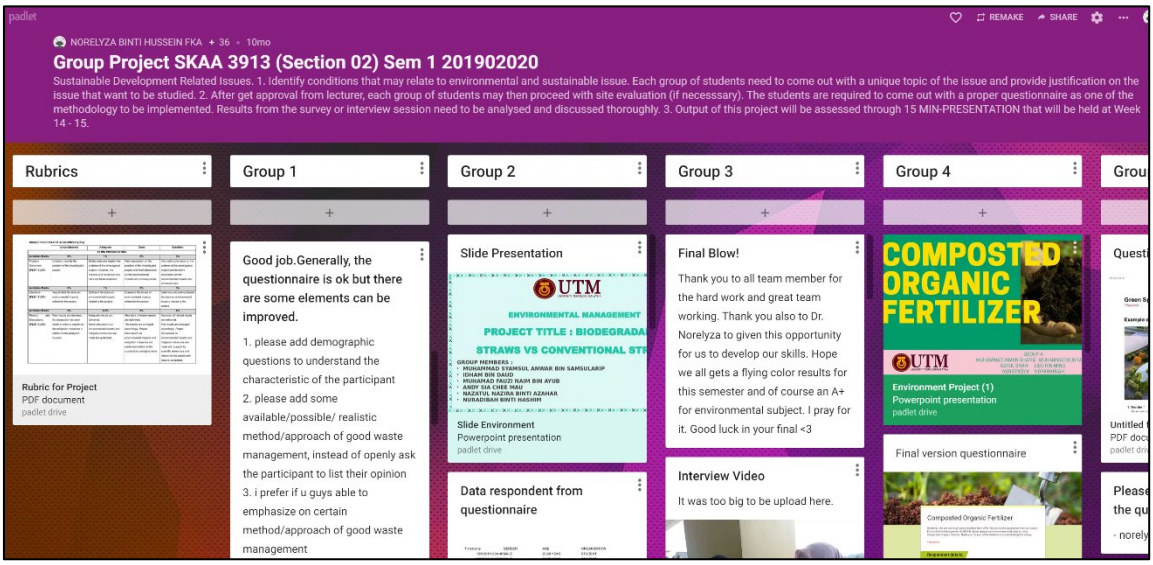

Figure 2: Padlet interface of complete online monitoring

Research Methodology

A quantitative research design via questionnaire was carried out among a group of third-year civil engineering students that consist of forty-nine (49) students who enrolled in the Environmental Management course. The students' perception of blended project-based learning using Padlet platform were investigated. The questionnaires were distributed among the students after the project completed.

Findings

Figure 3 (a) shows the students' perception of project-based blended learning using Padlet improve the student understanding of the task given. 76% of the student agreed that their understanding of the task improves as project-based blended learning was applied in conducting the project. Moreover, 88% of the student agreed that continuous monitoring helps them in completion of the project as shown in Figure 3 (b). The findings indicate that the project-based blended learning approach using Padlet platform indeed able to aid the students to complete the project with sufficient understanding.

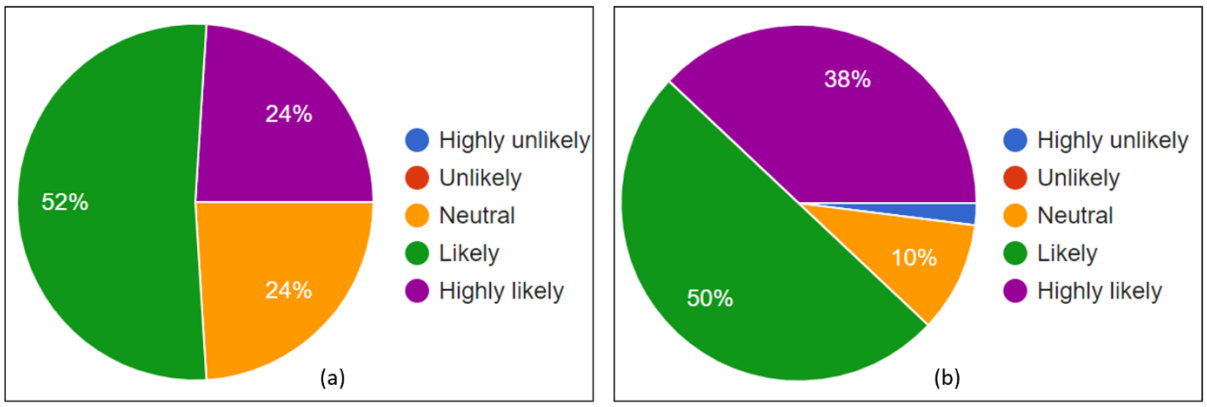

Figure 3: (a) Students' perception of project-based blended learning using Padlet improve the student understanding on the task given (b) Students' perception of continuous monitoring by the instructor improve the process of completion of the project

Figure 4 (a) illustrates that project-based blended learning approach helps the student to address the outcome of the project correctly as 76% of the students likely to agree with the statement. However, there are 4% of the student which refer to 2 out of 49 students that disagree with the statement as the students stated that they were unable to access Padlet platform as they having an issue with internet connection. Even though the internet connection issue became the main disadvantage of project-based blended learning approach, most of the students agreed that the Padlet platform improves the communication between the instructor and the students as illustrated in Figure 4 (b). 80% of the students stated that Padlet platform facilitates the communication between the instructor and the students as they easily communicate without having face to face engagement.

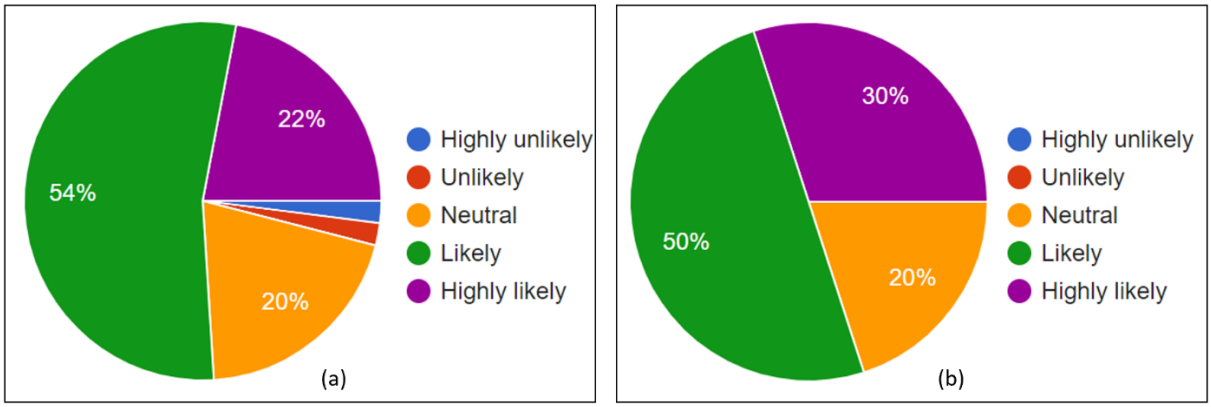

Figure 4: (a) Students' perception of project-based blended learning approach help to correctly address the output of the project (b) Students' perception of Padlet platform improve the communication between instructor and students during project monitoring process

Conclusion

The study showed the project-based blended learning approach using Padlet platform able to improve the students' understanding of the task given and aid in the project completion. Moreover, the communication between the instructor and the students improved greatly as the students can easily communicate with the instructor without having face to face engagement. However, the issue of internet connection needs to be addressed to improve the effectiveness of project-based blended learning approach using Padlet platform.

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Nurturing Children for Future Challenges in STEM Education

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Highlights: Early childhood education is a time of tremendous growth with brain development at its peak. During this period, children are highly influenced by the environment, their parents, and the people around them. In this study, the STEM concept Fun Learning Toy Library (FLTL) provides a promising environment for pre-school children to manifest their interest in science, technology, engineering science, and technology was developed. This enjoyable learning facility was built in Sekolah Kebangsaan Seneng, Bachok where this place is one of the rural areas in Kelantan, Malaysia. It found that most of the students have been motivated to develop a deep interest in science, technology, engineering, and mathematics (STEM) education for their future endeavors. Having this advanced toy library in the school, these children become excited and motivated to attend the school which prepares them for future challenges in STEM education.

Key words: STEM; early childhood; toy library

Introduction

The development of science, technology, engineering, and mathematics (STEM) education was historically emphasized after the Russian launch of the Sputnik satellite in 1957. The stress and rapid reshaping of globalized economic and business, especially after World War II, required fundamental shifts to foster critical thinking and raises student interest in STEM careers, who are creative, problem-solving candidates, and innovative. Due to that reason, in early-1960, the United States developed the science curriculum and the global leader in STEM literacy, and employment initiatives to ensure the sustainability of the creation of scientists and engineers for future usage (Akpan, 2017). Instead of teaching disciplines in independent subject silos, one of the newly developed methods as known as STEM education was introduced in 2001 by scientific administrators at the U.S. National Science Foundation (NSF) (Furst-Holloway & Miner, 2019). The need for STEM education becomes essential as the requirement of new skills. By exposing students to STEM and giving them opportunities to explore STEM-related concepts may help them face the challenges of globalization and a knowledge-based economy (Bybee, 2013; Seong, 2019) in the future.

During the first few years of life, a child learns a lot about themselves, promotes their intellectual development and have initially tried to represent of objects, space, time, causality, and self-constructed gradually during the first 2 years, where parents and infants are their first teachers. For healthy development, children need to explore their language, communication skill, written, inside-outside activities, physically active as an active stimulation, and interaction with others. The years from birth to age five are viewed as a critical period for developing the foundations for thinking, behaving, and emotional well-being (Cohen, 2006; Seaman & Giles, 2019). Further, early childhood education is the most beneficial since kindergarten begins around the ages of 5 to 6 for most children. It is in these classrooms where children have their first interactions with people outside of their family. Formal early childhood education focuses on strengthening the "learning through play" by providing a hands-on, interactive atmosphere where children learn about themselves through playing with other children. Referring to Leseman et al (Leseman, 2012), preschool programs provide early childhood education, care for children, and help them develop a range of skills that make them school readiness. Such skills include (i) Social skills; (ii) Language skills; (iii) Executive function skills; (iv) Emotional self-regulation skills; and (v) Self-regulation in learning skills (Ansari, Pianta, Whittaker, Vitiello, & Ruzek, 2020).

STEM education mainly purposes to produce human capital that can be utilized interdisciplinary knowledge and an applicative approach in problem-solving. It is evidenced that STEM education teaching and learning processes can enhance critical thinking and problem-solving skills in learners (Madden et al., 2013). These skills are necessary to ensure that learners can think critically and creatively which will eventually stimulate their innovative thinking. After the first successful implementation of Fun Learning Toy Library (FLTL) learning concept of STEM in a Kuala Geris school in Kelantan, the research team received some requests from other schools to duplicate the FLTL model to be implemented in their pre-school classes. Therefore, our fourth project was conducted from 9 to 12 March 2017 at Sek. Kebangsaan Seneng, Bachok, Kelantan. Since then the team has been back to the school to collect data and do follow-up visits for monitoring the impact of FLTL at both schools in Kelantan.

Methodology

Sekolah Kebangsaan Seneng (SK Seneng) is located in a rural area of Bachok, Kelantan, Malaysia. SK Seneng has three preschool classes, however, only one was developed to be a FLTL classroom, with 25 students. The students are between the ages of 5 and 6 years old, with a dedicated teacher and a teacher assistant.

Figure 1 shows the framework for data collection for FLTL development at SK Seneng, and its impact. Data were collected through observations, interviews, and document review (Hussain et al., 2019; Norehan Haron et al., 2019). Analysis of the data collected elaborates on the development of FLTL and shows the impact of the FLTL, which are expressed in terms of students' motivation, attendance, and student yearly performance. Since it's implementation, the school has been visited annually to collect data from current and past students of FLTL class.

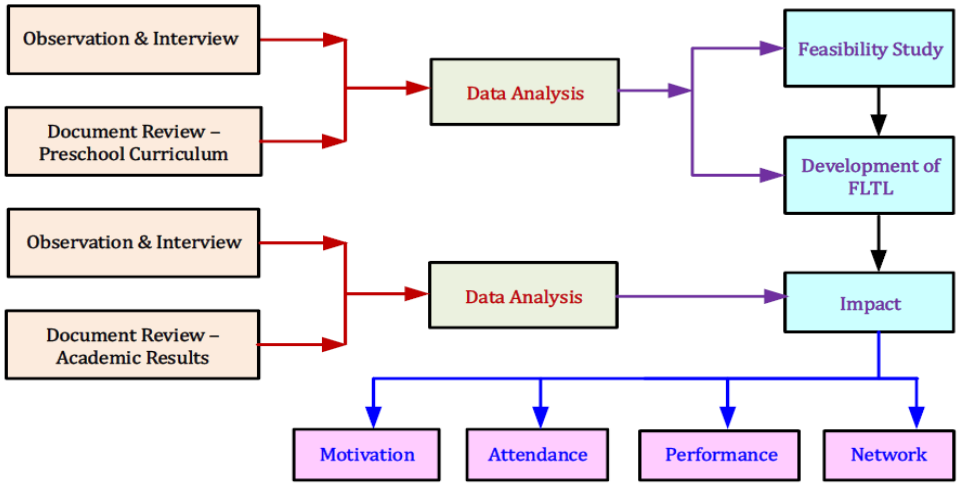

Figure 1

Results and Discussion

The concept of FLTL is learning through play; learning while having fun; and the library concept of the toys and books. The focus is to provide toys to support the preschool students learning process of STEM. Positive feedback was gathered through interviews and communication with the teacher via social media, such as WhatsApp messages. The teacher highlighted that students are very creative in exploring the toys. Although the teacher had to put more effort into monitoring and supervising them, the toys are a great tool that helps the teaching and learning process. The students were reported to enjoy the hands-on activities, and that over 50% of them met the practical skills objectives. The teacher also reported that school attendance shows an improvement. The students' performance was analyzed in terms of their understanding of STEM subjects before and after FLTL was implemented. Based on the interview data that was recorded and transcribed, the preschool students are happy to come to school, looking forward to playing with the toys, and not worried about being away from home to go to school. They can provide answers to STEM questions and expressed that the learning environment is conducive. The students also show confidence in communicating with us, being 'an outsider' to their rural community. Although the teachers are concerned with the over-enthusiastic preschool students that require more attention, on the whole, the FLTL has a very positive impact on students' performance and motivations.

Conclusions

The FLTL has also successfully created students' awareness in the everyday life applications of science, technology, and math. The concept of a fun learning environment that the FLTL provides has contributed to the success of this project. Additionally, the teachers' motivation and commitment to using the toys creatively in delivering lessons are seen as added values to the outcomes of the project. Thus, this project of developing and implementing the Fun Learning Toy Library seems to fill in the gap of the national aspiration. By inculcating motivation and interest in STEM education at the preschool level, it is hoped that these students will be embarking into STEM for their future endeavors. The long-term benefit of the FLTL implementation at the preschool level is grooming future scientists and engineers from the root. The successful development of FLTL at this school has attracted Acre Works Sdn Bhd. to provide us the funding to establish another FLTL at a school in Johor and to develop a STEM laboratory in Universiti Teknologi Malaysia.

Acknowledgment

Our acknowledgment goes to all sponsors, especially to Acre Works Ptd. Ltd. (Kuala Lumpur, Malaysia) through Industrial Collaboration Programme (ICP), organizations and individuals; Universiti Teknologi Malaysia, staff, and volunteers; SK Seneng, Bachok, Kelantan, Malaysia teachers, students, school management and parents; and the Ministry of Education.

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Embedding Monsoonsim Erm Simulation in Classroom Activity

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Highlights: MonsoonSIM is a cloud-based business simulation and experiential learning platform, with data analytic, for teaching & learning. The simulation can also be used to enhance students' other attributes such as leadership, teamwork, critical and creative thinking. This project was conducted to investigate the use of web-based MonsoonSIM ERP simulation as an experiential learning tool for undergraduate students in Critical and Creative Thinking course. Its obejctives are to explore the learning outcomes based on students' individual reflection and to analyse the thinking tools utilised by students such as Scamper, SWOT, Brainstorming, Ishikawa, PMI, AGO, PC or C&S.

Key words: MonsoonSIM; business simulation; experiential learning; graduate attributes; critical and creative thinking skills.

Introduction (Project or Innovation)

MonsoonSIM is a business simulation or specifically enterprise resource management (ERM) simulation that only recognised by SAP (http://www.monsoonsim.com/guide.html?stage=ABOUT_MSIM). UTM has subscribed MonsoonSIM Business Simulation since 2016 and has embedded MonsoonSIM in several courses involving thousands of students from business, engineering and social science faculties. This project is based on case study, embedding MonsoonSIM in Critical and Creative Thinking (UHAS2122 and UHAK2122) class during Semester 1 2019/2020.

The MonsoonSIM is a combination of simulation and games. The players (students) we have to run their own business like real business competition. Each team is allocated with some amount of money as initial capital. They have to manage the resources within the given time period (in this case 60 days; 20 seconds for 1 day). They have to set the retail price, set allowance for retail space and rent, monitor the current markets and the forecast, keep a sharp eye to the store to see that it is neither overflown nor products or run out of it. The winner basically is based on certain KPI including net profit. However, competition is just one third of the 30 marks. There rest are based on group project and personal reflection.

We studied the impact of MonsoonSIM on 40 students from Critical and Creative Thinking class. Based on thematic analysis, we discover three major outcomes; knowledge and understanding, skills and behavioural, and perception and attitude. We also found that students have used the critical and creative thinking tools (that have been discussed class) in their group assignment when they were asked to propose new ideas to upgrade and to innovate MonsoonSIM.

Content (Project or Innovation)

- Project or innovation objectives

This study investigated the use of web-based MonsoonSIM ERP simulation as an experiential learning experience for undergraduate students in subject Critical and Creative Thinking. Besides, to explore learning outcome based on students' individual reflection and to analyse thinking tools that have been used by students in their group project.

NALI approach implemented in the research (e.g. novelty, creativity, innovativeness, applicability and impact)

We are among pioneers on embedding MonsoonSIM in classroom, in Malaysia as well as in global context. Therefore, we have been keynote speakers and invited speakers in MonsoonSIM International Seminar/Workshop to share our experiences, in Singapore, Hong Kong and Penang, Malaysia.

Indeed, we were the first to embed MonsoonSIM in Critical and Creative Thinking subject as previously, it has been embedded and business-related subjects in higher education institution as shown in Figure 1.

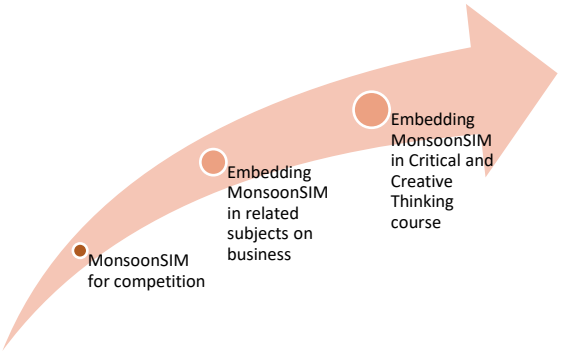

Figure 1: Pioneer in embedding MonsoonSIM in Critical and Creative Thinking course

In this project, MonsoonSIM has been used for CLO 4 while the PLO is CS4 which deal with conducting oral and written presentation on final design. Within assessment 4, there are conventional games (10%) and simulation games (MonsoonSIM) (30%). MonsoonSIM contribute 30% as details:

a) Games and competition (10%).

b) Individual reflection (10%).

c) Group report (creativity report) (10%).

The competition (10%) consists of scoring matrix (5%) and KPI target (5%) that being calculated by MonsoonSIM system. Scoring matrix setting (5%) is as below:

a) Net profit: 50%

b) Cash on hand: 10%

c) Sales retail: 20%

d) Sales service: 20%

e) Utilization retail space: 10%

Meanwhile, KPI Target setting (5%) is as below (in Singapore dollar):

a) Cash on Hand: 5,000,000

b) Net profit: 5,000,000

c) Sales retail: 6,000,000

d) Sales service: 600,000

e) Utilization retail space: 75%

In addition to that, individual reflection (10%) is referred to students' personal reflection based on the ERP simulation games that follow the context of general reflection on MonsoonSIM ERP games as well as reflection on critical (analysing and evaluating) and strategic thinking.

The rubric of individual reflection details are: Give clear and details evidence, fact and figure to support the reflection (9-10%), give evidence, fact and figure to support the reflection, but not clear and details (7-8%) and do not give evidence, fact and figure to support the reflection (5-6%).

The group project (10%) is basically is a kind of proposal on innovative idea to improve Monsoonsim or innovative idea to develop new simulation games by using any thinking tools, you have to show how the innovative idea had been developed.

Applicability: It is fun. Keep thinking strategically to win the games. It can be conducted anytime. We did it outside the classroom during night. It has been proven applicable to various courses/subjects in higher education institutions.

One of the impact is getting score 5.0 in ePPP. Based on thematic analysis, we discover three major outcomes; knowledge and understanding, skills and behavioural, and perception and attitude as shown in Table 1.

We also found that students have used the critical and creative thinking tools (that have been discussed class) in their group assignment when they were asked to propose new ideas to upgrade and to innovate MonsoonSIM;

Table 1: Three major outcomes based on students' individual reflection.

Knowledge and understanding outcome	Skills and behavioural outcome	Perception and attitude outcome
• **Business process.** • **ERP, retail, logistic management, finance, forecast, marketing, services.** • **Linkage between departments.** • **Supply and chain.**	• Communication. • Teamwork. • Strategic and analytical thinking. • Critical and creative thinking. • Business management skills - avoid overlapping tasks/roles.	• Interesting, informative, interactive. • Increase the interest of becoming an entrepreneur. • Useful in life. • Exciting as every new day is a new adventure. • Chance to apply accounting knowledge. • More love to business, as currently doing business. • Trust to team mate.

Research Methodology

Using a thematic and content analysis based on 40 students' individual reflection and group project, in identifying learning outcome and thinking tools.

Finding and discussion of the project or innovation

Based on students' individual reflection, major themes of learning outcome are knowledge and understanding, skills and behavioural, and perception and attitude.

Findings indicated that students have used various thinking tools in giving ideas to improve MonsoonSIM; Brainstorming (1), SWOT Analysis (2), Ishikawa Analysis (2), SCAMPER (6), PMI (4), AGO (4), APC (1) and C&S (2).

Notation: SCAMPER – Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse; PMI – Plus, Minus, Interesting; AGO – Aims, Goals, Objective; APC – Alternatives, Possibilities, Choices; C&S – Consequence and Sequel; PMI, AGO, APC and C&S are components of (Cognitive Research Trust) CoRT by Dr Edward de Bono.

Other relevant information (e.g. commercialization potential, awards received (title of project, exhibition and year))

Conduct workshop or training in enhancing business skills (as well as critical and creative thinking skills) among students, entrepreneurs and staffs.

So far, AMBANK HQ, Kuala Lumpur and Kolej Vokasional Perdagangan, Johor Bahru were our clients.

In the corporate context, MonsoonSIM could be kind of evaluation and assessment of staffs, team building activity in empowering synergy among staffs and different departments. Among entrepreneurs and entrepreneurs-to-be, MonsoonSIM could be a part of basic training course to enhance ERP management skills.

Our achievement:

a) Won International University-Industry Award in NALI Competition 2018.
b) Malaysian Champions and 1st runner-up in 2017(Mechanical eng. students).
c) Five consecutive years (2016, 2017, 2018, 2019, 2020) represented Malaysia at the regional competition.
d) Students got a job through MonsoonSIM certificate and business concept understanding.
e) This year (2020) two UTM teams became the Malaysian Champions (AHIBS students) and 1st runner-up (AHIBS/Eng. students) respectively. Three UTM teams will represent Malaysia for International MonsoonSIM Competition that will be organized by Deakin University, Melbourne, Australia.

Acknowledgement (if any)

We are grateful to Prof. Dr Nur Naha Abu Mansor, Dean of AHIBS, Prof. Ts. Dr. Intan Zaurah Mat Darus, the director, centre for academic and experiential learning, and Assoc. Prof. Dr Mohd Zaidi Abd Rozan the former director of

utmxcite for their support in the procurement of the monsoonsim server since 2016 until 2020. we want to thank them for the trust that they have given us to undertake the monsoonsim project in utm. monsoonsim is indeed a superior tool that can be utilized to enhance students' knowledge and skills in understanding business processes, it is also suitable for developing and enhancing students' graduate attributes such as leadership, teamworking and critical and creative thinkings skills among others.

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Virtual Reality Welding Simulation Kit for Learning and Acquiring Welding Psychomotor Skills

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Highlights: The Virtual Reality Welding Simulation Kit (VR Welding Kit) is a mobile application that integrates the virtual reality (VR) technology with physical equipment, which allows students to learn and acquire psychomotor skills in welding operation. The training simulation utilizes the Vuforia tracking engine to detect the 3D printed welding torch and the image marker of welding metal to simulate the welding process inside the virtual world. This training simulation is cost effective, affordable and timely for distance learners in the current Covid19 pandemic and digital technology era. It has the potential to improve the efficiency in learning welding psychomotor skills, and to provide a less costly means for students to construct their own skills and knowledge compared to the physical workshop facility.

Key words: Virtual reality; engineering education; welding training; human-computer interaction; simulation

Introduction

Welding is a highly demanded skill, essential for various industries, including aerospace, mechanical, and construction. One needs to undergo lengthy practical sessions to become a skilful welder. However, conventional training is very costly in terms of material, time, and infrastructure (Torres-Guerro *et al.*, 2019; Ko *et al.*, 2019; Price *et al.*, 2019). Welding involve extensive training requiring intense level of hand-eye coordination movement. The welding work environment exposes trainers to intense arc light, sparks, gases, ultraviolet rays which are dangerous and harmful to health (Figure 1).

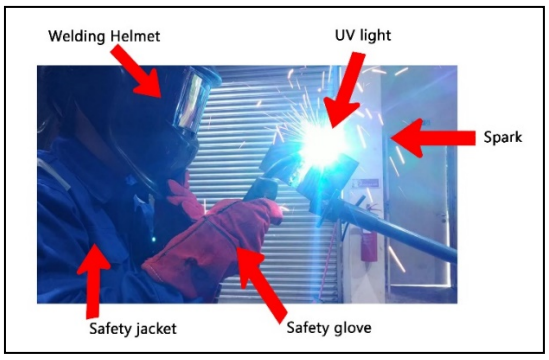

Figure 2: Metal bar welding environment.

In parallel to the Industrial Revolution 4.0, virtual reality (VR) is one of the effective ways for the students to practice welding virtually. In the VR application, the users immerse into the virtual world and can interact with the virtual objects. Past research shows that the VR intervention in welding training not only can improve the knowledge transfer and save a lot of consumable costs but also support a new form of pedagogical approach and learning experiences (Torres-Guerro *et al.*, 2019; Stone *et al.*, 2013). This project presents the use of VR mobile devices in welding training simulation. The innovation objectives are described as:

1. To design a virtual welding training simulation by using VR and Vuforia tracking engine that can deliver psychomotor skills of welding process.
2. To present a mobile-based application which utilized cost-effective physical equipment and the proposed virtual welding training simulation.

Methodology

The research methodology consists of three phases. The first phase is the problem identification and requirement analysis. The current issues were collected by conducting interviews and compared to the literature review. The interview participants were lecturers and welding technicians, as subject matter experts. Besides, the welding syllabus and practical training were also acquired to develop the suitable VR simulation content.

Based on the requirements obtained from the first phase, the researchers proceed in the second phase to design and develop the welding training simulation prototype (VR Welding Kit). The third phase is testing and evaluation of the system by expert reviews and user study. User Acceptance Testing (UAT) is designed and conducted in the user study by developing a suitable questionnaire based on ten Nielsen's heuristics evaluation. The evaluation methodology consists of pre and post welding training sessions to collect data on how the users feel and their perception when using the VR Kit. The questions are focused on the ease of use, the intuitiveness of Graphical User Interfaces (GUI), level of immersion, knowledge gained and other recommendations. The results from the user study should be very valuable to determine the effectiveness of the proposed method in welding training, as well as the suggestions to improve the human-computer interaction (HCI) of the system.

Development of the VR Kit and its operation

The VR Kit consists of a 3D printed welding torch, cardboard, a mobile phone, and a smartphone-based head-mounted display (HMD) set. The virtual welding simulation system is developed using Unity3D software and Vuforia engine. The Vuforia tracking engine is utilized to provide an alternative user interaction for training welding's psychomotor skills. The completed system is deployed as an Android Package Kit (APK) and was installed inside the Android mobile phone, which is then attached to a HMD set for users to wear. The users are required to hold a 3D printed welding torch to allow the system to track the marker to update the position and orientation of the welding torch in the virtual world. Figure 2 shows the setup on the VR Welding Kit and how the users interact with the 3D printed welding torch and image marker cardboard. The system utilizes the camera embedded on the mobile phone to track the marker on the 3D printed welding torch and cardboard. All the processes are executed and then displayed in the HMD setup. This welding simulation prototype focused on the metal inert gas (MIG) welding.

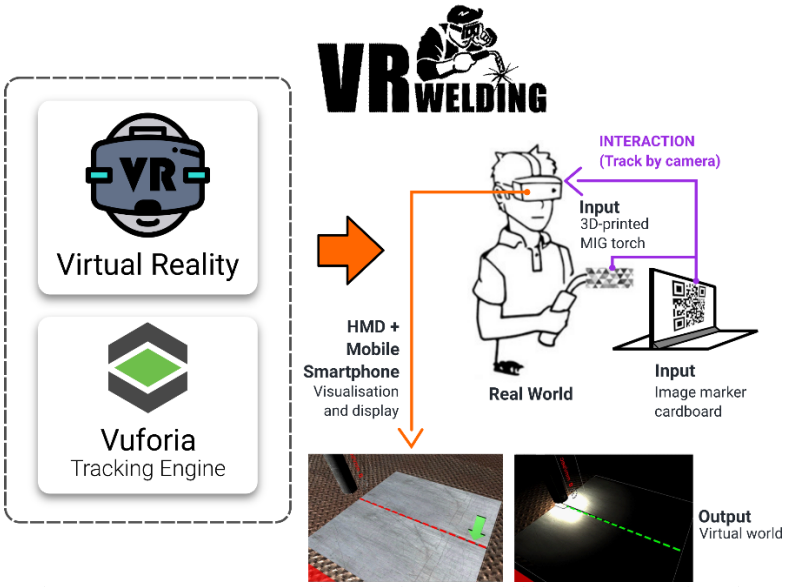

Figure 2: The proposed user interaction when using the VR Welding Kit.

The VR Kit provides users with the skills to control welding torch movements, such as maintaining consistent speed, proper travel angle, arc distance between the electrode and the base metal. The virtual base metal or metal plate is placed on top of the tracking marker. For this prototype, six welding positions were included which are 1F, 1G, 2F, 2G, 3F and 3G as shown in Figure 3. The letter "F" stands for fillet weld and letter "G" represents the groove weld. Meanwhile, the welding position's name and scores were placed on the right of the virtual workshop table. These GUI provides the information to the user regarding the recognition of various welding position types and their current performance when conducting the welding process.

Analysis

MIG welding is an arc welding process in which a continuous solid wire electrode is fed through a welding gun and into the weld pool, joining the two base materials together. The weld pool was simulated using terrain technique to produce low polygon weld pool for the optimization purposes. Figure 4 shows the example of virtual environment and the weld pool after user performed welding operation on the virtual metal plate. The environment turned to dark whenever the welding process are executed, which successfully simulate the auto-darkening of the safety helmet, which protects the user's eyes from the UV light.

Results were collected from two subject matter experts: a welding technician from Faculty of Engineering, UTM, and a welding lecturer from School of Education, Faculty of Social Sciences and Humanities, UTM. The capability of VR Kit as a training tool was tested by both experts, and they responded to a set of evaluation questions. The proposed system was commended to be an effective tool to teach the students about the proper work angle, hand coordination and travel speed during welding training. Besides, the welding technician also stated that the system can help the student to practice various waving techniques as found in the welding skills. Additional positive feedback includes the possible assessment of psychomotor skills which were currently not measured as such for engineering students. The experts also suggested improvements related to the application's definition and record of the welding pool results at the end of each welding position to enable further evaluation.

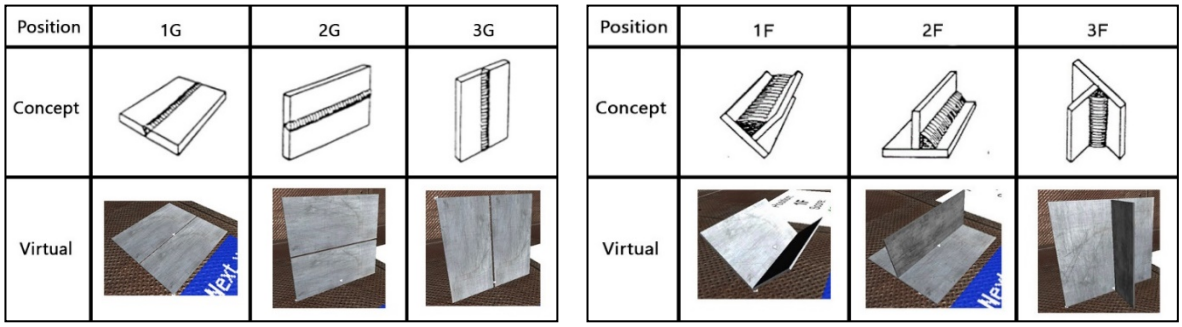

Figure 3: Comparison of the virtual plate design with real concept for groove and fillet welding.

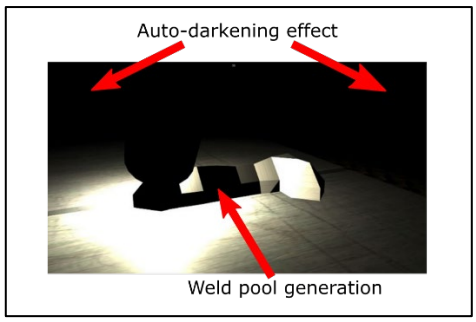

Figure 4: The weld pool generation and darkening effect of MIG welding.

Testing the system by engineering students as users for welding performance metrics, such as the welding speed, work and travel angles and completion time, is unable to be conducted for now due to the Covid19 Pandemic limitations. Therefore, this will be the next course of action.

Project Novelty

The virtual welding training simulation is a potential and marketable mobile application for psychomotor skills training that will revolutionise the use of mobile phone in the Technical and Vocational Education and Training (TVET) domain. The novelty of this project is the use of mobile phone and 3D printed physical tools as the training instruments, which provides an alternative and cost-effective solution. Almost all adult individuals own smartphones, thus, making it convenient and accessible for psychomotor learning to take place from any location.

Acknowledgement

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A Japanese Language Learning App Using Mobile Augmented Reality

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Highlights: UMK Japanese Language Augmented Reality App or UMKJapAR is the educational app allows students to have a far more engaging and enriching Japanese Language learning experience using interactive Augmented Reality (AR). This app is the first mobile AR app helps students learn the language through life-like 3D animated avatars' conversations.

Key words: 3D Animated Avatars; Augmented Reality; Conversations; Japanese Language

Introduction

Augmented Reality (AR) provides so many opportunities and great experiences for language teaching and learning. It allows the user to view the pop-up digital content in the real environment by scanning a marker using a mobile device. UMK Japanese Language Augmented Reality App or UMKJapAR is the world's first mobile AR app helps students learn the Japanese language through life-like 3D animated avatars' conversations. UMKJapAR further allows students to learn at their own pace and revisit the lessons as many times as required. It also makes the learning process fun and enjoyable. This project is developed using the ADDIE model, which includes the Analysis, Design, Development, Implementation, and Evaluation. The project showed that AR improves student engagement and learning outcomes as compared to traditional learning and teaching materials. AR is making a significant positive impact on learning the Japanese language.

Objectives

There are three main objectives of this project: 1. To develop life-like 3D animated avatars' Japanese language conversations. 2. To create an innovative and engaging AR app for learning the Japanese language. 3. To measure the effectiveness and efficiency of the proposed educational AR-based app.

Novelty

The novelty of this project is the first life-like 3D animated avatars' Japanese language conversations AR app for enhancing students learning experience and engagement in Japanese language.

Creativity

The creativity of this project: 1. Realistic 3D animated avatars' conversations. 2. Bringing learning to life through immersive experiences by adding interactive and engaging digital content. 3. Give students more active, effective and meaningful learning processes.

Innovativeness

The innovativeness of this project: 1. To integrate the 4th Industrial Revolution (4IR) components – AR into university' curricula. 2. To learn the Japanese language outside the traditional learning and teaching materials. 3. To hybrid visualization approaches in AR for ubiquitous learning activities. 4. To provide better and more cost-effective solutions to the education sector.

Applicability

The applicability of this project: 1. AR used as a teaching and learning tool in university courses to improve learning outcomes. 2. To improve students' Japanese language capabilities, such as reading, listening and speaking by AR technology. 3. Student's self-paced learning. 4. To enhance the students' motivation and comprehension by AR-based educational app.

Methodology

The Analysis, Design, Development, Implementation and Evaluation (ADDIE) model as shown in Figure 1 was applied successfully in this project to develop Japanese language learning app using mobile AR. In this project, the analysis stage was the beginning of the user requirements and AR app requirements analysis. The design stage of the ADDIE model was the crafting of the digital content and user interface design. The development stage of the ADDIE model was the creation of digital and AR content. The implementation stage began with delivery of the Japanese language AR app to the students and implemented in the classroom activity. The final process in ADDIE model was the evaluation stage which was the collecting students' feedback and data.

Figure 1: ADDIE model.

Results and Discussion

The results indicate that 100% of students enjoyed reading Japanese AR app. Also, 95% of students found that the UMKJapAR mobile app was fun and easy to use. Furthermore, 87% of students felt that the UMKJapAR mobile app helped them strengthen their Japanese speaking, listening, and reading skills. Additionally, 87% of students willing to continue to explore and motivate them in learning Japanese by using AR-based app. These findings reveal that the proposed educational AR-based app can improve students' motivation and interest, increased students' performance, and enhance students' retention for a longer time in learning Japanese language.

Acknowledgement

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Biomechanical Analysis of Developing Low Back Pain for Standing Person

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Highlights: Biomechanics is one of the integrated course in many academic programmes such as Physiotherapy, Occupational and Safety, and Bioengineering. It is usually apply physics principles such as mechanical system to analyze human movements. In biomechanics, there are many required testing tools to analyze any sort of human movemets. In this study the force plate was used to analyze human standing and by determining the ground reaction force (GRF) at both legs. The test results showed the dissimilarities in distributing body weight in each leg represents the compression load acting against GRF.

Key words: Back Pain; Biomechanics; Force, GRF; Standing

Introduction

Teaching a biomechanics course at school and university require to have high knowledge in mechanical and musculoskeletal systems. It requires applying the physics principles in mechanical systems to explain the human body movements involving musculoskeletal system. Determining the acting ground reaction force (GRF) against body weight using force plate is one example of studying a body movement from sitting to standing position. There are many previous studies showed that the GRF was high for a standing person that possibility develops low back pain (Patric et al., 2017, Michael et al., 2017; Peter and William, 2016). The objective of this study is to determine the values of ground reaction force (GRF) at different body movements as shown in Figure 1and identify their possibility of causing low back pain.

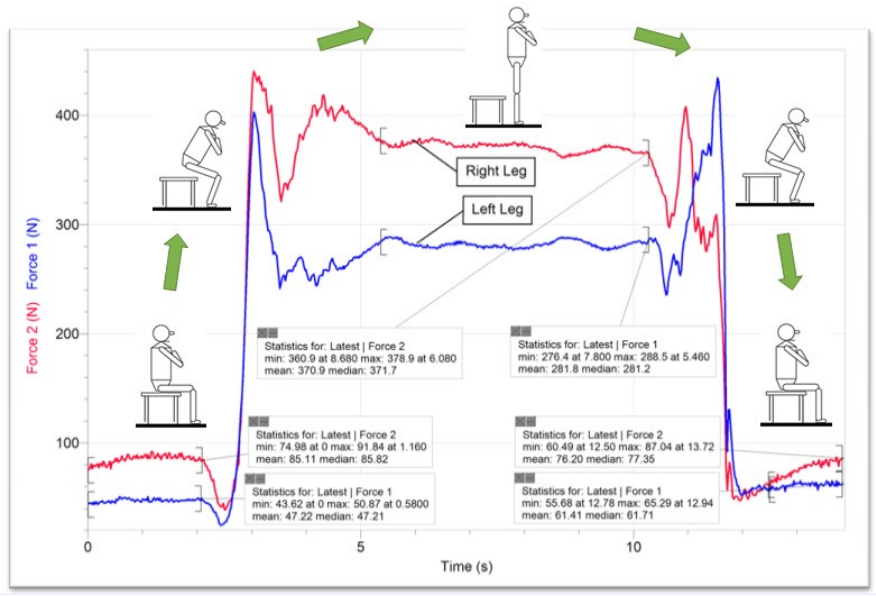

Figure 1: GRF values for right and left legs during different body activities

Methodology

The ground reaction force is usually the acting force against body weight for standing person. It can be determined by using of a force plate. The force plate is a test tool usually is placing over the floor and requires standing or walking over it. In this study, a 66.5 kg person requires to sit on a chair and placing each of his leg on a separate force plates. Next, he requires moving his body at different positions including standing up, standing for a while on force plate, and then sitting down. The GRF for both legs was recorded as a graph shown in Figure 1. The GRF value is then determined for both legs and analyzed to find the distribution of GRF at each leg. Any dissimilarity in GRF values may require an estimation of any possibility of low back pain.

Finding and Discussion

Estimating the values of ground reaction force (GRF) represents one of the practical methods in biomechanics to identify any possibility of health hazard. The results of the study showed the dissimilarities in the values of GRF for both legs as presented in Table 1. It was found that different activities of body movements have different value of GRF. The right leg has more GRF values compare to left leg at different body positions. As expected for standing time, the maximum value of GRF was 440 N and 400 N for right and left legs that represents 129% of body weight. This GRF value is less compare to 165% of body weight for a person standing in a moving bus (Patric et al., 2017).

Table 1: Example of GRF values for Right and Left Legs.

Body Activity/ Movement	Right Leg (RL) (Newton)	Left Leg (LL) (Newton)	GRF Level	
			Low	High
Sitting	85.11	43.62	LL	RL
Standing up	42-440	26-400	LL	RL
Standing	370.9	281.8	LL	RL
Sitting Down	310-48	430-52	RL	LL
Sitting Again	76.20	61.41	LL	RL

In general, there is a possibility of developing low back pain if a person stands for long time doing certain activities such as teaching in school for half an hour standing in classroom or doing manual handling activities in stand position at a defined workstation. The situation will be worse if there is unequal distribution of GRF in both legs as presented in Figure 1. One of suggested solution to decrease the risk of developing low back pain during prolonged standing using of a sloped surface (Erika and Jack, 2010).

Awards Received

S/N	Award	Title of project	Exhibition	Year
1	Silver Medal	Disease Prevention and Health Promotion: Test workplace for Radon	Selangor Innovation & Creativity Exposition (SLICE '18), Shah Alam	2018
2	Bronze Medal	Practical Simple Method of Avoiding Radon Accumulation for Health Promotion	ASIA International Innovation Exhibition (AIINEx) 2020, Johor	2020

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Engaging students learning through scenario-based learning

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Highlights: This paper describes innovative techniques in engaging students using scenario-based learning technique by using toy bricks and paper plane simulation games. The Operations Management and Supply Chain Management courses are typically delivered through lectures, discussions, and case studies. However, toy bricks and paper plane simulation games were introduced in class as a scenario in production. A survey has been conducted in investigating students' perspectives of this technique. The survey shows that majority of the students agreed that these techniques increases their interests and understanding of the subjects and these techniques are regarded as a valuable tools in the business curriculum and should be included in the future.

Key words: Toys Brick; Paper plane game, Operations Management; Supply Chain Management, Scenario-Based Learning

Introduction

This paper presents innovative techniques of using toy bricks and paper plane games for Operations Management and Supply Chain Management courses in Azman Hashim International Business School (AHIBS), Universiti Teknologi Malaysia. The courses are typically delivered via lectures, discussions and case studies. However, the innovative toy bricks and paper plane simulation games were introduced in this class starting in semester 1 2017/2018 to groups of students majoring in Management of Technology in AHIBS, UTM. The followings are the objectives of these teaching innovations:

1. To improve students' understanding of Operations Management topics i.e Material Requirement Planning (MRP), Inventory Management, Layout Strategy Line-balancing, Lean production, Jobs design and Quality Control which are considered relatively challenging among students.

2. To introduce scenario-based learning among students by incorporating toy bricks and paper plane games in a production scenario.

3. To enhance students' learning via team-working and applying operation management and supply chain management theories i.e MRP theory.

4. To emphasize the "reflection-on-action" and "reflection-in-action" learning techniques among students.

The feedback from this study will help researchers in improving the innovative teaching technique in the classroom.

NALI implementation approach

NALI approach implemented in the research are:

Novelty: An original teaching technique using toy bricks and paper plane as a medium in executing the manufacturing process as per MRP concept.

Creativity: Embedding toy bricks and challenging students' ability to execute given tasks within a given time frame.

Innovativeness: Integrating students' learning process in assembling the toy bricks and paper plane in a production scenario along with producing "part request form" using the computers.

Applicability and impact: Toy bricks and paper plane simulation games provide many opportunities for simulating real production scenarios with great flexibilities for instructors to tailor those activities to their teaching needs. Students' obtain significant in-depth understanding and experiences with regards to the actual MRP process that help them to reflect the theories learned in class.

Research Methodology

To investigate the effectiveness of these teaching techniques, questionnaires were distributed via Google form to 45 students enrolled in Operation Management and Supply Chain Management courses. The 5-point Likert scale was used in the questionnaire.

Finding and discussion

- There are 29 students responded to this survey. 41.4% of the respondents were male while 58.6% were female. Table 1 shows the findings of the study.

Table 1: Students' perspective on the implementation of Toy Bricks and Paper Plane simulation game

Items	Mean	%				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The game has adequate information to assist me in decision making	4.59	65.5	27.6	6.9	0	0
I increase my skills in analysing relevant data to make managerial decisions	4.62	65.5	31	3.4	0	0
I think playing this game has enhanced my interest in this course	4.69	72.4	24.1	3.4	0	0
I got better understanding on the related course material after playing this game	4.66	69	27.6	3.4	0	0
I think playing this game help me communicate more effectively	4.31	37.9	55.2	6.9	0	0
All members in my group contributed equally to the work	4.55	62.1	31	6.9	0	0
There was a high-level of co-operation in my group	4.48	55.5	37.9	6.9	0	0
I think playing this game help me understand how to better organise a group work as a team	4.66	69	27.6	3.4	0	0
I consider the toy bricks game a valuable learning tool in a business curriculum	4.58	62.1	34.5	3.4	0	0
The toy bricks game should be part of the operations management in the future	4.58	65.5	27.6	6.9	0	0
I enjoyed playing the game and liked the excitement of competing with others	4.48	55.2	37.9	6.9	0	0
I think the game was interesting	4.79	82.8	18.8	3.4	0	0
I would like to play this game again	4.62	79.3	13.8	3.4	0	0

The paper plane simulation game replicates the production process in manufacturing organisation. In the first round, students were divided into 6 workstations. Each workstation consists uneven number of students, tasks were distributed unevenly, and ineffective layout of workstations was used. Students were given 8 minutes in each cycle to produce paper planes and deliver to customers. The paper planes must conform to the quality required by customers. After the first round, students need to analyse the problems occur in production. In the second round of the game, students need to make improvement based on the problems identified in the first round. Among the problems identified by students were uneven workers and uneven tasks distributed in each workstation causes certain workstation become bottleneck in production line. Un-skills workers affect the quality of the product produce and ineffective layout results in higher transportation costs. Students started the round two with improved workstation, balance tasks in each workstation, balance number of students in each workstation, quality control operator for every incoming and outgoing process, improved layout to eliminate waste (transportation costs). The second round of the

game shows that students can deliver the paper plane with higher output and higher quality and lower rejection rates from the customers.

Among the feedback from students that participated in this paper plane simulation game include: "This game is interesting with different level of education"; "By playing this game help me a lot in organizing and understand how do operation works since I do have no experience in working in operation line"; "This game make me more understand about operation management. It also enhances my thinking and communication skills. One of the best ways to make student more understand in the class besides giving lecturer; "Students can understand the importance of operation management because they were experiencing the process themselves"; "It makes the learning process a lot smoother and its enjoyable. It provided a better understanding of supply chain management"; "I think this game can give us more understanding about supply chain/operations management. Try to identify the problem during doing the paper plane and find the solution to enhance the efficiently of production".

There are many lessons learned from implementing the paper plane simulation game. Students be able to experience in identifying the operations problems in production. On top of that, students able to make improvement from each problem identified in the first round and this game integrates several concepts in Operations Management and Supply Chain Management simultaneously. Thus, this game able to enhance the engagement of students in these courses.

This innovative toy bricks game technique provides better integration of several concepts in the Operations Management course simultaneously. Among the experiences that have been developed includes identifying number and types of materials needed to be ordered from the warehouse (inventory) in order to fulfil customers' orders, exercising the quality check on products produced, drawing the product structure tree and producing bill of materials, calculating the MRP reports and managing procurement and inventories movement in the warehouse. These techniques covers different topics which normally taught in different chapters namely; Material Requirement Planning (MRP), Inventory Management, Layout Strategy, Line Balancing, Lean Production, Job Design and Quality Control.

Among the feedback from students that participated in this simulation game were relatively positive. Among the anecdotes given by students include: " This game can guide me to understand more about these topics"; " I love the game because instead of trying to grasp on the theory, I had the experience of applying it in a real situation"; "I am able to experience the reality of managing a warehouse, production and quality control"; This game gives me much knowledge about management and working in teams"; "This game comes out with a lot of enjoyable tasks which provide opportunities to apply it in the real life"; "Playing this game improves my understanding about the MRP concept".

There are many lessons learned from implementing the toy bricks into a production scenario. It promotes change and educational practice, especially through student experience and feedback. Traditional examination assessment only focus on 'what a student knows' instead of 'how the student came to know something new.' This toy brick technic illuminates the implicit process of students' thinking and reflection on the knowledge that they learned in class into conducting the given tasks as Maguire (2006, 67) argues that it is time to 'make visible the conditions of knowledge production, lest we create more alienating knowledge'. The authors suggest honouring student voices by embracing the process of learning and valuing the collaborations amongst students and instructors.

This technique emphasizes on the use of toy bricks in a production scenario to enhance the learning process of students on Operations Management subject. The learning process gives the opportunity for students to apply their theoretical knowledge into practice through reflection-on-action and reflection-in-action in completing the required tasks. This study lends support to the argument by Hermant *et al.* (2015), who strongly promote the learning process in entrepreneurship education to focus on real-world experience, action, and reflective processes to engage students in authentic learning. The authors belief that this strategy would lead to greater entrepreneurial abilities and propensity, which eventually enhance the entrepreneurial performance, which benefits individuals and societies.

In conclusion, this innovative toy bricks technique is very innovative and effective pedagogical technique in teaching Operations Management. Initially, the technique clearly demonstrated the increase in students' interest in the subject, improve their team working and communication skills, and their engagement in class. Students strongly recommend that this technique is embedded into the teaching of Operations Management courses.

COMMERCIALIZATION POTENTIAL

This innovative teaching technique has a high potential for commercialization. This toy bricks has been registered as IP. This technique can be marketed to all public and private institutions that offer Operations Management courses. It can also be targeted to Secondary schools and colleges that offer Commerce subject.

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Membangunkan Model Visualisasi Astronomi Untuk Pengajaran dan Pembelajaran Astronomi di Malaysia

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Highlights: Astronomi adalah satu bidang yang telah berkembang sejak beratus-ratus tahun dahulu dan sangat menarik untuk diterokai kerana bidang ini melibatkan kehidupan seharian manusia di dunia ini. Kini, kursus astronomi telah diterapkan dalam silibus pembelajaran sekolah rendah dan menengah melibatkan beberapa tajuk seperti Bumi, Matahari, Sistem Suria, Bintang, Buruj dan sebagainya. Namun, para pelajar sukar untuk menyentuh dan melihat secara fizikal serta menggambarkan bentuk matahari, buruj dan bintang tanpa adanya satu contoh fizikal model bagi objek-objek cakerawala tersebut. Oleh itu, kajian membangunkan model visualisasi astronomi untuk proses pengajaran dan pembelajaran iaitu model fizikal matahari dan projektor bintang telah dihasilkan.

Kata kunci: Model Fizikal; Visualisasi; Astronomi; Pengajaran; Pembelajaran

Pengenalan

Astronomi adalah cabang ilmu alam yang meliputi pengamatan benda-benda langit serta fenomena-fenomena alam yang terjadi di luar atmosfera Bumi. Ilmu ini secara asasnya mempelajari pelbagai sisi dari benda-benda langit seperti asal-usul, fizik/kimia, meteorologi dan pergerakannya. Perkataan astronomi adalah gabungan perkataan bahasa Yunani iaitu astronomous di mana astro bererti perihal bintang-bintang manakala nomous bererti ilmu. Ramai ahli-ahli astronomi Yunani telah mencerap bintang dan menamakan bintang tersebut hingga dikenali pada masa sekarang. Walau bagaimanapun, dalam Al Quran sendiri telah membuktikan tentang astronomi secara ilmiahnya melalui firman Allah SWT:

"Dia Pencipta langit dan bumi. Bagaimana Dia mempunyai anak padahal Dia tidak mempunyai isteri. Dia menciptakan segala sesuatu; dan Dia mengetahui segala sesuatu."

(Al-An'am:101)

Firman Allah di atas cukup menunjukkan bukti tentang ilmu astronomi yang sebenarnya telah lama ada. Kini sub-bidang Ilmu astronomi boleh dilihat pada kursus Sekolah Rendah atau Menengah, di bawah tema 'Bumi dan Alam Semesta' dan 'Astronomi dan Penerokaan Angkasa Lepas'. Ia tidak menjadi subjek tersendiri, tetapi terkandung dalam mata pelajaran Sains (Roslizah, 2007). Skop dan definisi Astronomi yang telah berubah daripada "sains berkaitan objek di angkasa" (Hartmann, 1987) kepada skop yang lebih luas meliputi bidang-bidang sains yang lain telah menghasilkan teknologi yang mampu mengubah cara kehidupan manusia hari ini. Pengetahuan tentang sistem orbit misalnya telah menghasilkan teknologi satelit yang telah mengubah sistem perhubungan masakini. Perkembangan Ilmu astronomi kepada bidang sains yang lebih mencapah atau khusus (sub-bidang) juga telah menenggelamkan Ilmu astronomi itu sendiri sehingga ramai yang tidak menyedari banyak aplikasi atau teknologi yang digunakan hari ini adalah faedah daripada kajian Astronomi.

Menurut Roslizah (2007), kurikulum sekolah rendah mengandungi tajuk 'Mensyukuri keindahan malam yang diterangi sinaran bulan' dan 'Mengagumi alam ciptaan Tuhan' manakala sekolah menengah di tingkatan 3 pula menyarankan agar pelajar memikirkan tentang alam semesta. Selaras dengan objektif pembelajaran bagi sub bidang astronomi dalam matapelajaran Sains tingkatan 3, iaitu memahami bintang dan galaksi dalam alam semesta dan menganalisis matahari serta memahami perkembangan dalam bidang astronomi. Sukatan pelajaran bagi subjek-subjek yang terdapat dalam buku teks sekolah menengah juga telah menampakkan adanya elemen-elemen yang berkaitan Astronomi (Aizan, Nur Nabilah dan Siti Hajar, 2016).

Namun, permasalahan yang timbul adalah pelajar tidak dapat gambaran yang jelas tentang struktur objek cakerawala seperti matahari dan buruj itu dengan lebih dekat lagi tanpa adanya bahan bantu mengajar. Oleh yang demikian, dengan adanya model fizikal sebagai alat bantu mengajar dapat membantu para pelajar untuk mendapatkan gambaran yang jelas tentang apa yang dipelajari oleh mereka. Oleh itu, inovasi pembangunan fizikal model visualisasi astronomi menerusi pendekatan *New Academia Learning Innovation* (NALI) ini dilaksanakan bagi membantu guru dan pelajar dalam proses pengajaran dan pembelajaran serta menarik minat pelajar untuk mendalami ilmu astronomi itu sendiri. Kajian ini juga adalah suatu usaha untuk membuka minda bukan sahaja pelajar malah masyarakat dalam mengenali ilmu astronomi.

Objektif Projek

Matlamat utama kajian ini adalah untuk membangunkan model visualisasi astronomi untuk pengajaran dan pembelajaran astronomi. Objektif kajian ini adalah untuk membina model visualisasi astronomi iaitu matahari dan projektor bintang dan menganalisis keberkesanan fizikal model matahari dan projektor bintang yang dihasilkan.

Pendekatan NALI

Reka bentuk sesuatu model memerlukan penekanan yang lebih kerana setiap orang mempunyai pandangan yang berbeza terhadap kefahaman mereka. Oleh itu, reka bentuk sebuah model visualisasi bukanlah sesuatu yang mudah dan memerlukan idea yang terbaik bagi menyesuaikan dengan kehendak pengguna. Pengajaran yang abstrak akan menyebabkan timbulnya masalah salah konsep dalam minda pelajar. Hal ini berlaku disebabkan tahap imaginasi dan kognitif pelajar yang berbeza. Mempelajari dan membayangkan untuk melihat alam semesta tidak boleh di lihat dari bumi seperti keadaan sebenar permukaan matahari, maka dengan kehadiran fizikal model yang bersesuaian maka pelajar dapat melihat dengan mata sendiri apa yang terdapat di matahari kita.

Oleh itu, pembinaan model fizikal matahari dan projektor bintang seperti ditunjukkan pada Rajah 1 ini merupakan satu inovasi baru dalam pengajaran dan pembelajaran astronomi di Malaysia. Pembangunan model-model ini dilaksanakan bagi membantu pelajar supaya lebih faham dan dapat menguasai konsep matahari dan bintang dengan baik.

(a) (b)

Rajah 1. Prototaip model matahari dan projektor bintang

Penghasilan model ini telah dilaksanakan dengan rekabentuk dan kreativiti menerusi gabungan idea dan bahan pembinaan dengan kos yang murah. Kreativiti pembinaan model ini telah dilaksanakan berasaskan kepada beberapa elemen seperti saiz, ukuran, warna dan jenis bahan yang digunakan. Penghasilan model-model inovasi ini telah menjadikan aktiviti pengajaran dan pembelajaran astronomi lebih menarik dan mudah difahami oleh pelajar. Dengan adanya fizikal model ini ia dapat memudahkan tugas guru dalam pengajaran dan pembelajaran yang lebih inovatif lagi. Sekaligus dapat memberi kesan yang besar kepada pelajar dan menarik minat pelajar mempelajari topik ini kerana dengan model fizikal, mereka boleh membayangkan struktur matahari dan mengenali jenis-jenis bintang dan buruj dengan gambaran sebenar.

Metodologi Kajian

Penggunaan teknologi masa kini semakin mengembang dan sudah menjadi keperluan bagi setiap lapisan masyarakat termasuklah generasi kanak-kanak. Sistem pendidikan juga tidak melepaskan peluang dalam penggunaan teknologi maklumat. Leavitt (2012) berpendapat bahawa maklumat yang terkandung di dalam buku teks harus direka dan digunakan dengan cara yang dapat membantu pelajar untuk belajar.Walau bagaimana pun, wujudnya bahan bantu mengajar yang bukan elektronik atau bahasa mudahnya adalah bahan bantu mengajar 'tradisional' di mana ia masih lagi diperlukan oleh pelajar. Menurut Whitehead (1974), seseorang itu faham menerusi aktiviti *hands*-on yang dilakukan berbanding membaca, mendengar dan melihat. Hal ini menunjukkan bahawa pelajar lebih faham dengan pembelajaran yang melibatkan mereka menyentuh, melihat dan mendengar. Pembelajaran berbantukan model fizikal dapat membantu pelajar supaya lebih memahami dan permulaan untuk menarik minat pelajar dalam astronomi. Oleh itu, pembinaan model fizikal matahari dan projector bintang ini telah dilaksanakan dalam tiga peringkat seperti ditunjukkan dalam Rajah 2.

Rajah2. Peringkat perlaksanaan kajian

Peringkat pertama melibatkan aktiviti mereka bentuk prototaip model fizikal matahari dan projektor bintang. Pada peringkat ini, pengenalpastian masalah merupakan satu langkah pertama yang perlu diambil dalam menjalankan mana-mana projek kajian. Merekabentuk prototaip adalah proses pertama yang dilakukan sebelum membangunkan prototaip. Proses ini melibatkan 3 fasa yang perlu dilalui iaitu konsep reka bentuk, reka bentuk logik dan reka bentuk fizika. Perkara yang perlu diambil kira dalam menghasilkan reka bentuk adalah saiz, ukuran, warna dan jenis bahan. Konsep rekabentuk yang diperkenalkan adalah konsep model fizikal yang boleh disentuh, dilihat dan mudah diselenggara. Model ini menyediakan suatu gambaran yang realiti dengan kolaborasi warna yang menarik serta menyerupai warna objek sebenar. Bagi projector bintang, konsep yang dibawa adalah model fizikal yang boleh memancarkan gambaran bintang dan kumpulan bintang serta menggabungkan fasa-fasa bulan di mana ia amat sesuai di gunakan dalam pembelajaran angkasa lepas.

Seterusnya, peringkat kedua pula melibatkan pembinaan model fizikal matahari dan projektor bintang. Membangunkan sebuah model bukan sesuatu yang mudah walaupun hanya prototaip. Bahan lapisan luar model fizikal matahari adalah berasal daripada bahan semula jadi iaitu globe bumi bersaiz kecil yang tidak digunakan lagi. Manakala bahan lapisan yang diguna pakai adalah tanah liat. Tanah liat yang dibentuk menjadi bentuk bulat dengan menggabungkan warna yang berbeza untuk menampakkan perbezaan lapisan matahari, kemudian tanah liat yang telah dibentuk dipanaskan sehingga mengeras. Platform matahari pula, bahan yang digunakan adalah bahan plastic terpakai. Bahan-bahan yang digunakan untuk membangunkan prototaip projector bintang salah satunya adalah, kertas lut sinar. Lukisan bintang dan buruj bintang dicetak di atas kertas lut sinar dan membentuk kertas tersebut dalam bentuk silinder. Platfom yang digunakan adalah bahan semula jadi seperti alat permainan, terdapat projektor di dalam platform tersebut. Projektor tersebut membekalkan lampu untuk memancarkan cahaya supaya gambaran bintang dapat dilihat.

Akhir sekali pada peringkat ketiga pula melibatkan aktiviti penilaian keberkesanan penggunaan model kepada pelajar. Proses penilaian telah dilaksanakan menerusi satu sesi pembelajaran menggunakan model fizikal tersebut bersama dua kumpulan pelajar iaitu pelajar Tingkatan 3, Maktab Rendah Sains Mara (MRSM), Lenggong, Perak dan pelajar Tahun 1 Kejuruteraan Geomatik. Proses penilaian ini dilakukan bagi melihat keberkesanan penggunaan model tersebut kepada pelajar. Intrument boring kaji selidik telah diedarkan kepada para pelajar. Borang kaji selidik ini mempunyai 2 bahagian di mana bahagian A diedarkan sebelum model fizikal diperkenalkan dan bahagian B diedarkan selepas model fizikal diperkenalkan. Setiap bahagian borang kaji selidik ini merangkumi 4 tema iaitu latar belakang responden, pengetahuan berkaitan astronomi, kualiti model dan pendapat dan cadangan responden.

Hasil dan analisis

Seramai 171 orang responden telah dipilih dan diedarkan soal selidik kepada mereka selepas aktiviti pengajaran dan pembelajaran dilaksanakan. Responden adalah terdiri dari 49 orang pelajar lelaki dan 80 orang pelajar perempuan dari MRSM Lenggong. Manakala pelajar Tahun 1 Kejuruteraan Geomatik terdiri daripada 24 orang pelajar lelaki dan 18 orang pelajar perempuan. Analisis latar belakang responden terbahagi kepada dua bahagian iaitu pengetahuan tentang asas astronomi dan pengalaman penggunaan model fizikal dalam pembelajaran astronomi serta institusi yang mereka sedang duduki. Jadual 1 menunjukkan hasil analisis keberkesanan dan kemudahgunaan sebelum dan selepas memperkenalkan Model Fizikal matahari dan Projektor Bintang.

Jadual 1: Analisis Pengetahuan Sebelum dan Selepas Memperkenalkan Model fizikal matahari dan projektor bintang

Perkara	MRSM Lenggong, Perak		Program Kejuruteraan Geomatik UTM	
	Sebelum(%)	Selepas(%)	Sebelum(%)	Selepas(%)
Pengetahuan tentang struktur lapisan matahari	69	100	26	100
Pengetahuan nama buruj bintang	22	100	47	95
Pengetahuan tentang nama bintang	43	100	88	100
Pengetahuan tentang sistem suria	91	99	84	95
Pengetahuan nama fasa-fasa bulan	86	89	52	95
Pengetahuan lapisan struktur bumi	37	81	53	90
Pengetahuan tentang kedudukan matahari	81	100	79	85
Pengetahuan kedudukan bintang	40	91	24	83
Pengetahuan nama fasa-fasa bulan	87	98	28	90

Lain-Lain Maklumat

Penghasilan model fizikal matahari dan projektor bintang ini berpotensi untuk dikomersialkan pada masa hadapan kepada semua peringkat Pendidikan rendah, menengah dan institusi pengajian tinggi yang mempunyai kursus Astronomi. Projek ini telah memenangi anugerah perak bagi tajuk "Astronomical Educational Kit" di Innovative Practises In Educaton and Industry Exhibition (I-PEiNX 2016) dan anugerah emas bagi tajuk "Trasferring Astronomy Knowledge through Service-Learning Approach" di NALI 2019.

Penghargaan

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Starting Young with STEM: Science, Technology, Engineering, and Mathematics Education is Fun

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Highlights: Having a toy library in the school, students become excited and motivated to attend school every day. This project aims to explore the involvemefnt and experience of a group of pre-school students in a STEM program designed using a toy library as a medium for learning STEM. This study was conducted with 35 pre-school students in one of a rural school in Johor. The toy library is developed as an enhancement from the previous fun learning toy library (FLTL) designed in Kelantan in 2016. Qualitative data was collected throughout the program to determine the influence of the toy library on student learning and involvement in STEM. The research found that the toy library enhanced students' engagement in STEM learning, leading to an increasing desire to learn STEM.

Keywords: STEM; early childhood; toy library

Introduction

This project is carried out at SK LKTP Ayer Hitam, Kluang, Johor, a public school located in a rural area in Johor, replicating our earlier projects in the remote location of Kelantan, where students are from low-income families. With initial assumptions that the children in the rural school in Johor have the same experience as the children in Kelantan, such as having no early exposure to STEM-based education and even toys to play with. The FLTL program is for pre-school children to cultivate an interest in learning science and mathematics, which are globally perceived as difficult subjects. With the STEM-based toy library classrooms, it is hoped that no one will be left behind in the development of the country, and these children can fulfil their potential. The first project started during the aftermath of a major flood disaster on the east coast of Malaysia (2015). It continues until now with various programs including motivational programs for students taking major national exams, and specific for parents. It is identified that many rural students were dropped-out and did not continue their studies in high school. One of the leading causes of students' poor performance is parental indifference. Support for the projects is from organizations like the State Education Department, Government Agencies, Education Ministry, NGOs, industries and universities. Sustainability of this project is ensured through close contacts with the school teachers, who use the FLTL, assess students' achievement and provide feedback during follow-up visits.

To inculcate interest among pre-school students in rural areas in the field of Science (S), Technology (T), Engineering (E), and Mathematics (M), and to develop a holistic future generation, this project integrates the religious and moral values (R) as well as arts and creativity (A) (STREAM). A feasibility study on learning activities of the public pre-school, space and availability of facilities was undertaken through observations, interviews and curriculum review. Official document review of the Ministry of Education (MOE) Malaysia pre-school curriculum shows six thrusts to fulfil. Therefore, this project proposed five (5) themes of STEM education that map to the six thrusts of MOE: Science, Engineering and Technology; Mathematics; Arts, Language and Creativity; Physical, Spiritual and Wellbeing; and Multimedia. Modules were developed, toy sets purchased and arranged in the classrooms according to the themes. Play-based learning is the learning concept used in this STREAM Fun Learning Toy Library project. It creates a fun learning environment and monitors the achievement of the learning outcomes. The pre-school students gain knowledge and skills through their involvement in role-play activities and experiment (learning by doing) that help stimulate their interest in STEM and motivation to learn through self-learning ability (self-regulated learning).

Our innovative approached for the children at a very young age can increase their interest in STEM education. Pre-school children in a rural area are limited to learn with suitable toys, especially during school time. Some of the children are very excited because they only have the opportunity to play with toys only at school. The toys that we provide at FLTL consist of educational toys from the shelve where the children can relate with their essential founding of education such as reading, counting and logic and toys with green technology such as solar, wind and water. We also arrange a program with teachers and children where we teach them how to use the recycle items and convert them into toys. The development of FLTL in rural areas has given a new face to the pre-school because we refurbished the classes like a library full of toys for the children to play throughout their lesson at school.

Early Childhood Learning

During the first few years of life, a child learns a lot about themselves and the world around them, and parents are their first teachers. However, for healthy development, children need active stimulation and interaction with others. At this age is where early childhood education is the most beneficial. It is in these classrooms where children have their first interactions with people outside of their family. Early childhood education focuses on "learning through play" by providing a hands-on, interactive atmosphere where children learn about themselves through playing with other children. Referring to Leseman (2012), pre-school programs provide early childhood education and care for children and help them develop a range of skills that make them ready to learn when they start school. Such skills include (i) Social skills; (ii) Language skills; (iii) Executive function skills; (iv) Emotional self-regulation skills; and (v) Self-regulation in learning skills. In fact, the years from birth to age five are viewed as a critical period for developing the foundations for thinking, behaving and emotional wellbeing (Bakken et al., 2017; Melhuish and Barnes, 2012, Haron et al., 2019).

Fun Learning Toy Library

The FLTL module is focused on exposing and attracting pre-school children to the fields of Science, Technology, Engineering, Arts and Mathematics (STEAM). The development of this FLTL Module is in line with the requirements of the National Preschool Standard Curriculum (KSPK) issued by the Ministry of Education Malaysia in April 2016 (Kementerian Pendidikan Malaysia, 2016). The core of FLTL Module Development is based on the six pillars of the Preschool Curriculum, namely: Communication, Spiritual, Attitudes and Values, Self-Skills, Physical and Aesthetic Development, Science and Technology and Humanity. Based on this, we arranged the class layout, as shown in Figure 1. We also considered the digital teaching materials in designing our FLTL. Teachers are provided with a desktop and projector or SMART TV to engage the preschoolers with the active learning activities together with the STEM toys.

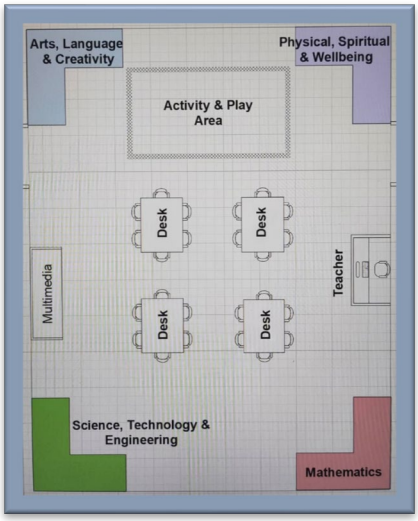

Figure 1: Fun Learning Toy Library arrangement plan

Methodology

This research used a qualitative method to identify the students' experience and engagement before and after the deployment of FLTL in their class. This research study was conducted in one school with two pre-school classrooms. One classroom consists of 14 students, and the other with 21 students. The school is located in the FELDA plantation area; the students who participated in the study are from the families who are working in the plantation. As such, we expected that there would be issues of low-class attendance and low interest in STEM learning, as our previous findings in Kelantan.

The team of researchers set up FLTL at two classrooms with specific toys that match the four themes as in Figure 1 (the group of toys are named Shopaholic, Little Chef, Super Power and Art & Creativity). Intervention by the teachers in running the lessons according to the KSPK curriculum was using the FLTL toys and approach. Collaboratively, the students played while learning STEAM.

The teachers were provided with FLTL checklists for collecting observation data of pre-test and post-test. The observations were to explore students' experience using FLTL and engagement with STEM in the classrooms, such as observations of the students' desire to explore the surrounding, cooperation values or using all senses during learning. The pre-test data were collected at the beginning of FLTL set-up, whilst the post-test data, using the same observation checklist items, was compiled after completing the school year. The teachers were also asked to provide feedback on the impact of FLTL from the perspectives of school, teachers, parents and students.

Analysis

The qualitative data collected was analyzed quantitatively where appropriate. The total scores for each component of STEM in the pre and post-test observation checklists are compared. The results indicated significant increases in the preschoolers' interest towards STEM. For example, in the science and technology section, one item 'The desire to know about the world around you' had increased from 46% to 60%, after applying FLTL in the lessons. The same happened with the mathematics section, for the same item: pre-test data was 42%, but post-test was 56%. Other items show improvements as well.

As for the teachers' feedback, they validated that the preschoolers gained more significant learning in STEM education. Responses from the teachers highlighted the impact of FLTL for the school, teachers, parents and students. The teachers highlighted that 'FLTL encourages active student involvement' and 'Increases students' motivation to learn'. In summary, teachers' comments were highly positive.

Commercialization Potential

This project has received interest from the Acre Works Ptd. Ltd to collaborate with us in developing FLTL in rural areas in Malaysia. Through industrial Collaboration program, we managed to secure RM20000 for a start to develop an FLTL model in UTM as a centre for research and activities. The FLTL modules will be developed for the commercialization purpose together with the FLTL models.

Conclusion

Preschool education needs to go from fearing STEM to playing with it and integrate STEM into the classroom. It is our responsibility (teachers, school, parents and community) to get involved with students learning of STEM, by encouraging and invigilating these young children in the use of educational tools and game to foster STEM skills. Additionally, regarding the researchers' initial assumptions that the children in the rural school in Johor have the same experience as the children in Kelantan, such as having no early exposure to STEM-based education, has low interest in STEM learning and even toys to play with were found to be inaccurate. From our observations during the series of visits to the school, prior to our FLTL, one of the teachers was already exposing his students with playing with robots as a reward for finishing class activities. This experience had impacted one student who told us that he is interested in becoming a robotics engineer when he grows up. This feedback acts as an indicator of the more significant potential FLTL is to pre-school students' interest in pursuing STEM education in the future.

Award received

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Enhancing Student Knowledge on Pricing Decision using Online Gamification during a Pandemic Crisis

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Highlights: Recent pandemic created chaos in teaching and learning since online learning becoming a norm to control the spread of Covid-19. This study explores the usage of online gamification to enhance student knowledge in pricing concept and practicality in a simulated environment. A close and open-ended survey was adopted to determine students' satisfaction and student knowledge enhancement for Pricing Decision. Results of the study highlighted that majority of students were satisfied with the experience while playing the game. Several themes such as knowledge, skills and tools have emerged to be the elements in enhancing students' understandings.

Key words: Experiential Learning; Pricing; Online Gamification; Generic Skills

Introduction

Covid-19 pandemic required educators to conduct classes online to reduce the disease outbreak. Thus, gamification is introduced in the Pricing Decision class. The subject involves the integration of calculation, marketing strategy, economic, accounting, psychology, distribution and entrepreneurship. The combination contributes to an advantageous market position appeals to target customers. The introduction of MonsoonSim is with regards to the teacher observation, whereby students have trouble understanding and applying the pricing concept that incorporates above mentioned holistic view, especially during online classes.

Content

This study aimed to enhance the student knowledge on Pricing Decision using online gamification during a crisis. The gamification improves student's engagement whilst optimizes their blended learning (Dicheva et al. 2017). It appeals to a youngster who is exposed to the Internet as well as provides fun virtual gaming simulating activities accessible everywhere, at any time.

The game thrives creative thinking skills into three stages: before, during and after the game. In the first stage, MonsoonSim allows students to create better role delegation as a team. It challenges students to synthesize information to applied Pricing Decision theory and prices modification. After the game, it stimulates creativity, providing a platform for students to evaluate performance for the consecutive rounds analytically; a crucial skill needed by many businesses to stay competitive nowadays. Therefore, using gamification to learn pricing strategies is considered an innovative way to enhance the concept and practicality. The educator role in the game is explored to the next level as the game allows a team's performance to be observed simultaneously resulting in continuous feedback given for mistakes made during the game. Prompt feedbacks helps students to rectify the right pricing strategies.

The impact of gamification on students, UTM and the industry is indeed positive. The game enhances student's holistic development through the application of practical, interpersonal, communication, digital, numeracy and leadership skills following the requirement of MQF 2.0. Indeed, the concept of experiential learning is integrated through

knowledge enhancement, the real application of business simulation and reflective observation throughout the game.

The game improves Pricing Decision strategy practices through scenario-based learning, where students run a virtual company. It caters to the Andragogy Learning that indicates adults adapt more to the learning pertinent to their work or their personal lives and prefer problem-centred 'experience'. This is still possible using ICT, especially during a pandemic, whereby face to face learning is not possible.

The impact of gamification for MonsoonSim on UTM is evident from the reputation over the past five years. The UTM brand can be seen in the Monsoonsim's website, a strong contender in competitions and is recognized as one of the active participants of Malaysian and Regional competitions. This year, UTM had successfully become the Champion, and 1st runner up for the e-MonsoonSIM Enterprise Resource Management Competition Malaysia Final and will represent Malaysia for the international competition in November.

Research Methodology

A web-based questionnaire through Google Form has been conducted consists of open and close-ended questions, distributed to 66 students in the Pricing Decision class. This study adopted qualitative and quantitative data analysis to examine the student's satisfaction and knowledge enhancement using online gaming. Descriptive analysis was adopted to analyze the quantitative data, and thematic analysis was used to analyze the qualitative data. Open, axial and selective coding was conducted to get the main themes on knowledge enhancement in this study.

Finding and discussion

The data was being analyses using the Grounded Theory Method for the qualitative approach. The first procedure started by reviewing the data and developing the categories of information. From the process of open coding, sixteen themes have been identified. The data then has been integrated and connected according to the classes based on the axial coding procedure. In this stage, sixteen themes have been grouped based on the relationship among the open codes. Finally, the core variables of the study had been identified based on the grouping themes. The core variables reflected the three-central theme of knowledge, skill and tools which enhanced the student's knowledge on the pricing decision strategy using gamification. To support the findings from the qualitative analysis, mean analysis is used from the quantitative analysis.

As seen in Table 1, with regards to the Likert Scale of 1 (poor) to 5 (excellent), the typical response values for a perceived level of skills at the start of the game is fair indicating equitable prior knowledge with the game. The level enhances to satisfactory during and post-game showing it is improving satisfaction to the students regarding the teaching and learning of Pricing Decision.

Table 1: Students Perception with MonsoonSim Game

Items	Mean
Perceived Level of skills and knowledge at the start of the game (pre-game)	2.50
Perceived Level of skills and knowledge at the middle of the game (during the game)	3.12
Perceived contribution of the game to student's level of skills and knowledge (post-game)	3.59

The first theme that emerged is knowledge, and it has several sub-themes, including the application of theory, enhancing pricing strategy and entrepreneurship knowledge. The majority agreed that gamification allows them to apply the theory into practice as claimed by students 32 "we can use the game as a platform to apply theories that we have learned in the class". Adopting the real business simulation enhanced students' understanding by applying the theory learned and linked with the strategy and decision-making process in the game.

They appreciated the experience obtained in the real situation of the business process with the meaningful gamification platform. They enhanced their knowledge on the subject with the practical skill approached in the games. Thus, it was proven that the application of gamification in education demonstrates knowledge enhancement through the integration of practical skill and cognitive skill in learning.

The second theme found significant is the game is exciting, provide real-time, experiential learning and able to enhance knowledge of the business process. Students highlighted that "It can release my stress and I have opportunity to know how to implement the game in the real situation' while for student 8, the game challenge his ability to think critically and creatively as a real business owner. As the game is real-time in a simulated environment, students feel confident to apply the knowledge into practice and reach the stage of the imagination of doing real business.

Enhancing students' skills is the third theme determined in this study. Adopting business simulation improve students' generic skills, such as critical thinking and decision-making. The majority agreed that it enhanced decision-making skills given the nature in this game; they have to apply decision-making skills at multiple levels. Student number 60 says "before playing the game; we need to discuss and assign roles to each team members to ensure we can manage well the inventories, setting price and sales". His statement supported that team working skills were applied during the game. Therefore, it is proven that this strategy provided a platform for students to grow teamworking and decision-making skills.

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The Medical Designers: Exposing MBA Healthcare Management students to design thinking approach to develop a patient-centric application

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Highlights: The project entitled The Medical Designers is a group project designed to expose the MBA students in Healthcare Informatics course to design thinking approach in building a patient-centric application. The students in the course include medical practitioners, dentists and officers in Malacca Healthcare Department. The class has produced two major community-based projects. One of the projects- the customer navigation application for Hospital Melaka have obtained a copyright status last July. The project also is listed as one of the finalists for Innovation Project Competition for Ministry of Health Malaysia. The result of the competition will be released in December 2020.

Key words: design thinking, MBA, healthcare informatics

Introduction

The project has objectives to design health or clinical system that can be applied to an organization and deliver an appropriate information technology solution for various aspects of the healthcare industry. Students were taught on the design thinking process in the class, and they applied this approach to their project.

Content

Patients experience is increasingly recognized as a pillar of quality in healthcare (Doyle, Lennox, & Bell, 2013). A systematic review of 55 studies indicated that patient experience was positively associated with clinical effectiveness and patient safety for a wide range of disease areas, settings, outcome measures and study designs. In the context of hospital design in Malaysia, a study had shown users experience and expectation are affecting patient satisfaction (Haron et al., 2011). Some of the methods to provide insights to patients' experience are the patient journey and user persona. These methods are primarily influenced by user-centric design in which user perspective is equally important besides technical and functional components (LeRouge, Ma, Sneha, & Tolle, 2013; Westbrook, Coiera, Gosling, & Braithwaite, 2007).

Most of the application in hospitals in Malaysia was designed and developed by external vendors. Little involvement from medical practitioners has resulted in a poor design that does not meet the end-user requirements. In realizing the importance of having a patient-centric application to improve patients and staff experience, the class has adopted the design thinking approach for its group project. The approach was taught in class, and students applied it in their project. Design thinking is a method for creative problem solving and a human-centred process, in which the designers have to keep the user as the core for the product development process.

Using the User Experience (UX) approach in the design thinking process, the students first made a field trip to the Hospital Jasin Rehabilitation Unit and Hospital Melaka to get the real scenario of the patients and staff as they are the users in this project. The students created user personas based on interviews and observations. The students highlighted the users' pain and gain, and they came up with ideas through this practice. The students applied various methods to understand patients' journey, create empathy map and designed a wireframe to test their ideas.

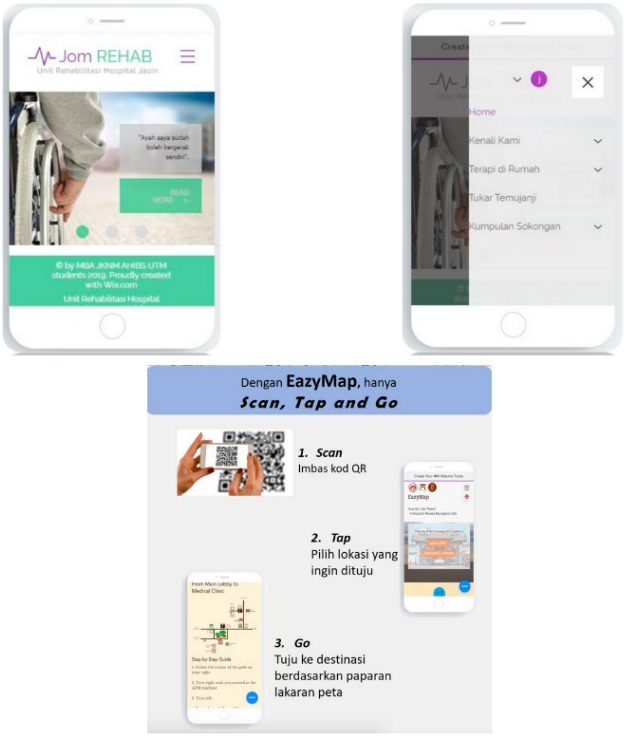
Figure 1: Creating empathy map based from data collected

This project had brought together a group of postgraduate students from medical backgrounds in creating a mobile responsive website application that could benefit the patients and the staff in the respected hospitals. It involved active learning activities in the class, collaboration with hospital's stakeholders and exposure to the software application to design and build the application.

Figure 2: Group Discussion

The students gave their best to complete the application within such a short period, amidst some challenges. None of them had any exposure in application design and development. Hence, it was a massive challenge for them, coupled with the limited time they had since all of them are working full time as medical practitioners.

Figure 3: The end product by the medical practitioners who have zero knowledge on application design .



Nevertheless, the experience was eye-opening, and the amount of new knowledge exposed to them was tremendous. This project had contributed to the deepening of their understanding regarding their patients and caregivers' experiences in the hospital. Understanding the patients and staff experience through a different perspective made them realized things that never came across their minds as medical practitioners. Their self-esteem was also boosted when they finally completed the project despite facing all kinds of challenges.

One of the projects- the patients' navigation application in Hospital Melaka have obtained a copyright status last July. This project also has been listed as one of the finalists for Innovation Project Competition for Hospital Melaka. Result of the competition will be released in December 2020.

Acknowledgement

We would like to express our appreciation to all students in MBSA2823 Class, Semester 1 2019/2020, the management team and staff in Hospital Jasin and Hospital Melaka for their contribution in supporting this class project.,

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Graphic Styles Techniques Aids Instructional Games Design: Evidence from Students ' Experiences and Demographics Measures

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Highlights: As the improvement of education technology in the IR 4.0 era, studying the approach to graphic styles through educational games is an indispensable information in order to enhance digital learning. The visual styles can be the newest way to immerse a student in gaming. Learners perceived more when the graphic design fits their ideal features. This study will determine students' perceptions towards visual design by investigating graphic styles embraced today by Malaysian students, including parallels with their demographic's disparities and emotions, and their relationship with the virtual world of the game that will lead to outstanding academic performance.

Key words: Education technology; games; experiences; demographic; graphic styles;

Introduction

A large number of students (Lilian & Jasni, 2016) clarified that Malaysia's educational games need to be improved for the future, in that upgrading the visual design would encourage students interested in playing. With consideration for the efficacy of visualising (Lindh, 2018; Bollini, 2017; Gullick et al, 2017) educational games, it is important to recognise students' demographic factors (gender, areas and school streams) in stimulating conceptual thinking and mental models in the learning process. To evoke student experience, this is necessary to reveal concepts via graphic-style (McLaughlin et al, 2010) strategies ('Abstract' or 'Realistic'). The attributed graphic style indicates the proportion of the visual stimulus to let the game world be easier to convey, welcoming, and easily remembered. Taking into account the visual design aspects, this study examines the significance of graphical preferences, graphic style values and the importance of the graphic styles suitability to enrich the positive experiences of students to ensure the quality of educational games.

Research Questions

This study explores potential differences between educational games based on representation mode on demographic efficiency and experience retention. The research attempts to control possible variations in students' level of academic achievement, computer skills, and educational curriculum. This leads to the following research questions: will mode differences impact: i) demographic factor-based competencies? and ii) sustaining experience?

NALI approach implemented in the research

The 'Abstract' and 'Realistic' style concepts further studied would help educators and interface designers grow better educational games and increase the amount of educational games use in education. Developing a set of graphic style concepts as an important support prerequisite for directing students and minimising emotional tension, confusion, and dissatisfaction with the use of instructional technology. The consequences of mapping the right art direction will stimulate meaning, gather perception, communication accuracy, and generate guidance ideas for improving the game's visual design for Malaysia 's future.

Methodology

i) Participants
240 local students attended from six Sabah National Secondary Schools. Both students were chosen based on simple random sampling techniques divided into the experimental groups EBDGS A, N=120 and EBDGS R, N=120.

ii) **Experience Based Design Graphic Style (EBDGS) Prototypes**
EBDGS A (Abstract) and EBDGS R (Realistic) have two separate graphic style modes. 'Abstract' and 'Realistic' style variations depend on visual consistency complexities. The 'Abstract' style is more intense to produce simplistic

appearances (McLauglin et al, 2010) and the 'Realistic' style emphasises visualisation details similar to actual object views (Robbins, 2014, Rose, 2013).

iii) **Student Experience in Graphic Measurement Scale (SEIGMS) Questionnaire**
Two goals were created to establish the SEIGMS questionnaire: I the provision of a standard tool for estimating the EBDGS prototypes and ii) the assessment of the relationship between graphic design and experiences. SEIGMS consisted of 43 items to measure student experiences (motivation, engagement, enjoyment). Each item used 5-point Likert scales.

Finding and Discussion

The table 1 review shows the interactive effect on student experience between EBDGS modes and demographic variables.

Table 1: Interaction on student experiences between EBDGS groups and demographic factors.

	Motivation	Engagement	Enjoyment
EBDGS Modes x Gender – F (1, 236) =	16.181	18.303	24.106
p value	**.000****	**.000****	**.000****
EBDGS Modes x Areas – F (1, 236) =	7.152	15.400	10.833
p value	**.008***	**.000****	**0.001****
EBDGS Modes x School Streams – F (1, 236) =	25.578	24.535	26.520
p value	**.000****	**.000****	**.000****

*p <.01, **p < .001

i) Gender & Student Experience's
The results of interaction effect showed that visual modes and gender affect student motivation, engagement and enjoyment. ANOVA results shows that male students at EBDGS A are significantly more motivated (M = 3.944, SD = .720), engaged (M = 3.834, SD = .894) and enjoyed (M = 4.076, SD = .915) than male student in EBDGS R. As well as the female students, the female students experiencing EBDGS R more moderately engaged (M = 3.832, SD = .687) and enjoyed (M = 4.150, SD = .688) than students in EBDGS R. Results are in line with Steiner et al. (2009), which the male students are more active and focused on the game, also shown that reinforces the 'Abstract styles triggers a deeper level of perceptions in male.

ii) **Areas & Student Experience's**
Rural students in EBDGS A slightly more positive experiences among urban students and those students experienced EBDGS R. Results shown that demographic factors correspond to immediate optimal student experiences as supported with Hargittai & Hinnant (2008) and Haworth & Sedig (2011) to specificity visual appearance's effect studies. Therefore, student experience (motivation, commitment and enjoyment) is affected by representation graphic style and student areas.

iii) **School streams & Experience's**
The SMJK students also indicate significant difference in gameplay activities, which they are more motivated (M = 3.651, SD = .763), engaged (M = 3.601, SD = .700) and enjoyed (M = 3.817, SD = .834) in EBDGS R. SMK students who were exposed to EBDGS A more inspired (M = 4.230, SD = .516), engaged (M = 4.086, SD = .619) and enjoyed (M = 4.369, SD = .574) than SMK and SMJK students who played EBDGS R. Overall results indicate that student experiences are greatly affected by school streams and style modes.

Experience measurements indicate that 'Abstract' style strengthens the game's visual stimulus quality compared to 'Realistic' style. Educational games help to sustain motivation, engagement and enjoyment based on the visualisation of minimalism (Wouters et al, 2013), thereby endorsing the finding that abstractly presented information is extremely beneficial to cognitive stimulation. At the same time, demographic effect in terms of gender (Cela-Conde, et al, 2017), areas and school streams (Singh & Krishnan, 2014) integrates the practise of using graphic style in games. Eventually, appropriate appearance techniques are necessary to effectively deliver learning material. Additionally, the results of this study show the benefit of measurement for visual design experimentation and that it could be implemented progressively to future educational games to strengthen the field of educational technology. The findings indicate that a significant number of students prefer easier-to-see, easier-to-understand visual presentation and should emphasise aspects (simplified forms, solid colours and restricted textures) to enables enhance the functionality of educational games.

Conclusion

Significantly, research may reveal different views of using graphic style with the acquisition of applicable visualisation principles in Malaysia. It can reduce feelings of discomfort, boredom and disappointment by ensuring an accurate and comprehensive design system to provide a teaching and learning environment, particularly at 21st century education level. With the need for versatility, innovation and the responsibility to create educational games, it is important to develop a strategic visual structure to design the screen interfaces that fit students' tastes and expectations for understanding and learning. In performing the visualisation optimization technique, research is needed to address the game-building environment, design issues, what style was desired in game art. Two key forms of knowledge are thus integrated: I visual knowledge of appearance, knowledge based on student's perceptions, and ii) experience knowledge, knowledge based on the game environment. This contributes to the development of higher and deeper technology education for local students.

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CLR 2.0: A Scaffolding System to Enhance Students' Competency In Preparing Chemistry Practical Laboratory Reports

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Highlights: Chemistry Laboratory Report 2.0 (CLR 2.0) is a cyclical 4-stage scaffolding system which promotes a culture of continuous quality improvement (CQI) among students and staff of the Department of Chemistry, Faculty of Science UTM. CLR 2.0 is implemented through a comprehensive 6-section rubric and a guided visual template. Since its implementation in 2017, students recorded positive changes in three crucial segments of a scientific laboratory report: methodology, results, and discussion. In the future, CLR 2.0 can be developed into an integrated online system to be used at Faculty of Science, UTM

Key words: Chemistry, scaffolding, rubric, assessment, laboratory practice

Introduction

Undergraduate students majoring in Bachelor of Science in Chemistry and Bachelor of Science in Industrial Chemistry at the Faculty of Science, Universiti Teknologi Malaysia (UTM) are required to take Physical Chemistry Practical II (SSCC 2841) course in their second year of study, as part of their programme requirement. In this course, they have to conduct a series of laboratory experiments relating to Physical Chemistry II at designated sessions throughout the semester. The experiments are conducted in groups, under the supervision of lecturers and laboratory technicians. At the end of each experiment, the students will prepare and submit laboratory report, which details objectives, procedures, findings, and discussions on the experiment that they have conducted.

In conventional setup, students submit laboratory reports in hard copy format, following a specified template given by their lecturers at the start of their experiment session. Next, the lecturers would grade the laboratory reports, and key in the students' score into the academic management system. The whole process is linear, without opportunities for learning on the part of the student, as well as opportunities for active facilitation on the part of the lecturer. As a result, students may not be aware of possible mistakes and misconceptions that were presented in their laboratory reports. Furthermore, the quality of grading varied across sections, since there are multiple lecturers involved in the grading process.

To address the above-mentioned issues, a scaffolding system was proposed and implemented in three academic sessions since 2017. The system was called CLR 2.0, or Chemistry Laboratory Report 2.0. The objectives of CLR 2.0 are as follows:

1. To enable students to learn essential skills in scientific reporting of experiments;

2. To enable lecturers to effectively manage students' learning experience in the laboratory; and
3. To inculcate the culture of continuous quality improvement (CQI) among students and staff of the Department of Chemistry, Faculty of Science UTM

Methodology

A total of 330 students were involved in the scaffolding system: 93 students in the 2017/2018 academic session, 99 students in the 2018/2019 academic session, and 138 students in the 2019/2020 academic session.

The scaffolding system was implemented in a cyclical process flow:

1. Stage 1: Instructors involved in SSC2841 sit together to
    a. Discuss on student performance in the course,
    b. Prepare rubric for abstract, introduction, procedure, results, discussion, and conclusion
    c. Prepare template in MS PowerPoint to guide students in reporting
2. Stage 2: Instructors introduce cues, in the form of MS PowerPoint template during laboratory sessions
3. Stage 3: Students conduct experiments and submit report following the cues introduced
4. Stage 4: Instructors
    a. Discuss and provide feedback to students
    b. Discuss student attainment in SSC2841 among each other
    c. Improve rubric and template
    d. Establish revised scaffolding system for upcoming student cohort

Innovation highlight: A guided visual template for laboratory experiment reporting

Figure 1 below shows the guided visual template for reporting. Students prepare their laboratory report, following the visual template provided at each laboratory session.

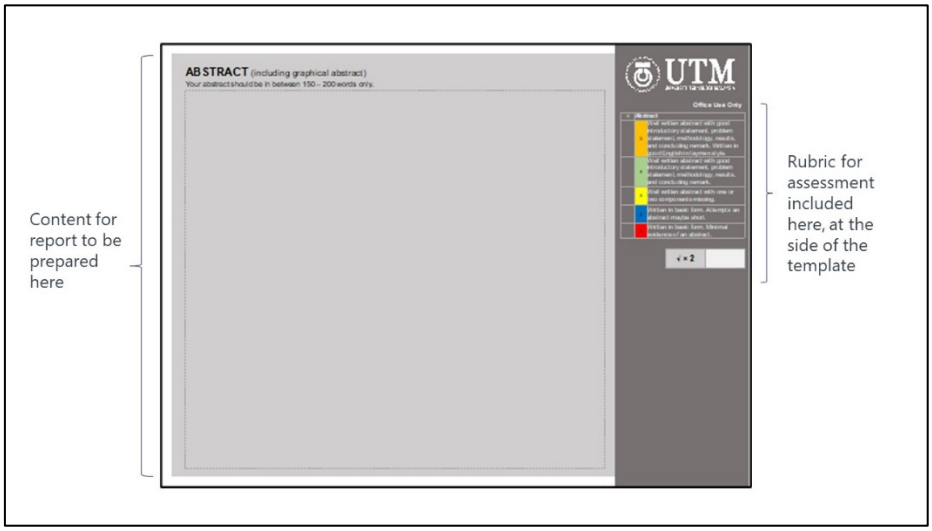

Figure 1: Sample guided visual template for abstract

Based on Figure 1 above, there is a blank session for students to prepare their content (abstract, introduction, procedure, results, discussion, and conclusion). At the side of guided visual template, students were given rubric based on the content required. Students were reminded to prepare their report, following the rubric provided in each section. The underlying design principles behind this guided visual template is outcome-based education (OBE), which embodies the idea that the best way to learn is to first determine what needs to be achieved. Once the end goal has been determined, the strategies, processes, techniques, and other ways and means may be put into place to achieve the goal (Yahya Samian, Yeo Kee Jiar, Hayati Abdullah, Istas Fahrurrazi Nusyirwan and Norihan Abu Hassan, 2016).

In the case of CLR 2.0, students were guided on what they should learn throughout their SSC2841 learning experience, through the guided visual template provided. At the end of the day, it is the rubric that would facilitate desired changes in scientific reporting of laboratory experiments within the learners, by increasing knowledge, developing skills and/or positively influencing attitudes, values and judgement.

Impact on students

Table 1 in the next page shows a comparison of scores for each section, based on the introduction of CLR 2.0 across the three academic terms. As can be seen in Table 1,

1. There are no changes in average score for abstract and introduction sections. This might be attributed to the simplicity in writing format for both sections.
2. There are positive changes in average score for methodology, results, and discussion sections. These are the most crucial parts in a scientific report, and are the hardest to write. The positive results are vital proof that CLR 2.0 scaffolding system did help students in understanding the requirements of scientific writing, and ability in writing the crucial sections.
3. There is negative change in average score for conclusion. This section is the easiest to prepare, since it requires students to project significance and implication of experiment in the Physical Chemistry field. However, students cannot grasp the technique and critical thinking required in writing conclusion.

Table 1: Average score 2019-2020 for each section assessed in laboratory report

Section	2019	2020	Change
Abstract	67.88	67.59	-0.29
Introduction	75.51	75.75	+0.24
Methodology	87.27	91.07	+3.80
Results	82.78	86.56	+3.78
Discussion	74.90	79.90	+5.00
Conclusion	93.31	71.56	-21.75

Future improvements

In the future, the following improvements can be done on the CLR 2.0 scaffolding system:

Short-term changes:

1. Refine the rubric applicable for conclusion, as this proves to be the weakest link among the students
2. Refine the look and feel of guided visual template to increase its appeal among students and staff

Mid-term changes:

1. Follow-up the CLR 2.0 scaffolding system with quantitative survey among students, and qualitative reflection reports among lecturers in order to evaluate the effectiveness of the process on teaching and learning

Long-term changes:

1. Convert CLR 2.0 into an integrated online system to be used at the Faculty of Science UTM, so that
    a. Students can submit their laboratory reports fully online,
    b. Lecturers can directly assess and provide feedback to students on their performance
    c. Student scores can be directly stored in university academic management system

Acknowledgement

The authors are grateful for the contribution of students and lecturers under SSC2841, for their commitment in implementing the CLR 20 scaffolding system.

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CAPTYCS: Enhancing Students' Problem-solving Process and Higher Order Thinking Through Online Learning Activities

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Highlights: Developing online learning activities might be overwhelming for instructors as it is important to develop online learning activities that is engaging yet challenging to enhance students' process of problem solving and promote students' higher order thinking. Therefore, a framework of online learning activities development, named as CAPTYCS was formulated to assist instructors in designing online learning activities. CAPTYCS was designed by incorporating 4 learning strategies (i.e. Typology of Problem, Criteria of Good Case, Five Stage Model, and Cognitive Scaffolding). Findings from this study found that students' problem-solving process and higher-order thinking significantly increased after participating in CAPTYCS online learning activities.

Key words: Online learning activities; problem-solving; higher order thinking; thinking skills; online discussion

Introduction

CAPTYCS was formulated to provide guideline for instructors and course designer to prepare and implement online learning activities. Especially during this trial time of global pandemic COVID-19, where many learning institutions are forced to conduct learning through online platform, many novice instructors are clueless on how to construct effective online learning activities. Therefore, CAPTYCS as an integration of several learning strategies serve as a 'short cut' guidance for educators. In this research, a framework of online learning activities development had been developed by integrating 4 learning strategies. These learning strategies comprised of (i) Characteristics of good cases by Jackson (1997), (ii) Typology of problem by Jonassen (2000), (iii) Cognitive Scaffolding by Jonassen (2011) and (iv) Salmon's Five Stages Model (2003). These 4 learning strategies were adapted to form a framework named as CAPTYCS.

Content

Project Objectives

The objectives of this project are

1. To design and implement comprehensive online learning activities based on CAPTYCS framework that can enhance students' problem-solving process and higher order thinking through online discussion forum.
2. To evaluate the effect of the developed online learning activities using CAPTYCS framework, on students' problem-solving process and higher-order thinking.
3. To examine the strength of CAPTYCS framework for online learning activities.

CAPTYCS

CAPTYCS framework focuses on two phases: (i) Development of learning activities and (ii) Implementation of online learning activities. Figure 1 depicts the integration of 4 learning strategies that formed CAPTYCS.

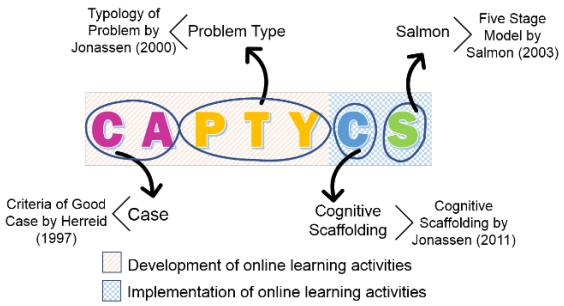

Figure 1: CAPTYCS

CAPTYCS as a framework of online learning activities development, aids instructors in several ways. Firstly, the integration of Typology of Problem by Jonassen (2000) and Characteristics of 'Good Case' by Herreid (1997) assist in construction of challenging yet engaging online learning activities. Typology of Problems listed the characteristics of 12 different types of learning problems, ranging from well-structured to ill-structured problems. It is hoped that the incorporation of Typology of Problems in CAPTYCS provide inspiration for online instructors to develop various types of online learning activities. On the other hand, to ensure the online learning activities is fun and engaging, Herreid (1997) has provide several characteristics of 'Good Cases'. Considering the impact of pandemic COVID-19, where students must continue their class remotely from home, engaging online learning activities is crucial to keep student motivated and focus on the learning task.

Secondly, considering that not every student is a competent problem-solver, assistance from online instructors is highly needed. Therefore, in CAPTYCS, cognitive scaffoldings by Jonassen (2011) is integrated to aid students' learning, especially to support their process of problem solving and promotes higher order thinking.

Apart from that, implementation of online learning activities needs to be carefully planned. The role of Five Stage Model by Salmon (2003) in CAPTYCS guides instructors on the essential scaffolding and technical supports that should be provided in each phase of online learning activities. Other than that, this model provides some insight for instructors to know what to expect in each stage of online learning activities.

Research Methodology

The sample of this study were 12 postgraduate students enrolled in Authoring System class. Five online learning activities have been developed according to CAPTYCS framework (i.e Rule-using, Decision-making, Troubleshooting, Design, Dilemma). These online learning activities have been validated by three experts in problem-solving research, to ensure these online learning activities serve the purpose of effective problem-solving activities.

The online discussion activities were delivered through an online discussion forum. Students discussion is also monitored and assisted through cognitive scaffolding provided by instructor. Students problem-solving process and higher order thinking were assessed through 2 performance tests conducted before and after students participated in online learning activities.

Finding and Discussions

The Wilcoxon Signed Rank Test revealed that there is a significant difference in students' problem-solving process in the pre- and post-test ($z = -2.987$, $p = 0.003$) with large effect size ($r = 0.610$). Similarly, there is a significant difference in students' higher order thinking scores in the pre- and post-test ($z = -3.06$, $p = 0.002$) with large effect size ($r = 0.625$). In both findings, students score in post-test is much higher than their pre-test score. Findings from these two analyses have confirmed that the students' problem-solving process and higher-order thinking increased significantly after participated in online learning activities developed using CAPTYCS.

As these learning activities were constructed using CAPTYCS, each learning activity is challenging and triggers students' higher-order thinking. Due to the cognitive scaffolding provided, students are more confident to present their ideas and justify their proposed solution. As highlighted in Salmon's Five Stages Model in CAPTYCS, students were provided with ample time and support to be comfortable with the online learning environment. Hence, students face no difficulties in committing to the online discussion.

Novelty, Innovative and Creativity of CAPTYCS

The formulation of CAPTYCS, which involves 4 different learning strategies that serve different purposes, is like a bridge that manifests different learning strategies into practical learning activities. The integration of these 4 learning strategies into one comprehensive framework has never been done before by previous researcher. Moreover, apart from Salmon's Five Stage Model, these learning strategies are usually implemented in face-to-face learning environment. However, this study aligned these 4 learning strategies together, to accommodate the need of online learning environment.

While most framework either focus on construction or delivery of learning tasks, CAPTYCS cater to both 'construction phase' and 'implementation phase' of an online learning activity, making this framework a comprehensive framework for online learning activities development.

Other than that, while most studies only emphasized on inclusion of well-structured and ill-structured problems, CAPTYCS explore deeper than 'structuredness' of problem. As highlighted in Typology of Problem, problems are varied in terms of context, structure, complexity, dynamicity, and domain specificity. Hence, CAPTYCS emphasized on the inclusion of various Types of Problem in learning activities.

In addition, CAPTYCS not only focus on the 'cognitive' aspect, but the 'fun and engaging' element of online learning activities, were also taken into consideration. Online learning activities that is produced using CAPTYCS were presented in a creative way, in form of comic, in form of an email, and narrative to enhance students' engagement.

Applicability of CAPTYCS

Due to the global pandemic COVID-19, many schools and learning institutions are forced to conduct learning through online platform. While the migration to online learning environment might be overwhelming to novice instructors, CAPTYCS offer a comprehensive guide for development of effective online learning activities, regardless of the learning content.

In a bigger context, CAPTYCS framework can help Ministry of Education and Ministry of Higher Education to implement latest teaching strategies through the implementation of CAPTYCS in schools and higher learning institutions.

Additional Information

CAPTYCS has high commercialization potential as a framework to construct problem-solving learning activities in e-learning platform. In addition, CAPTYCS is in the process to be compiled into an e-book for educators, as guidelines to develop comprehensive online learning activities that can enhance students' problem-solving process and higher-order thinking, regardless of the learning content. A QR code is also generated for easy distribution.

This project has received Bronze award for CAPTYCS framework in 1st Graduate Research Exhibition Competition 2017.

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A Comparative Study between Face-to-Face and Online Learning in Traffic Engineering course

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Highlights: Covid19 pandemic has prompted online teaching and learning (T&L) approaches in higher education in Malaysia. This study was conducted to assess the significance of using Telegram application as an online T&L tool on academic engagement and academic performances for third year students in School of Civil Engineering who enrolled in Traffic Engineering course. A quantitative study was carried out among two groups of students, namely Group A from semester 1 2019/2020 and Group B from semester 2 2019/2020 which experienced with different learning approaches, face-to-face and online via Telegram. Data were gathered and analysed from course learning outcome of both groups and added questionnaire on students' perception of using telegram for Group B. It was found that there is no significant difference in learning outcome between face-to-face and telegram-assisted online T&L approach. Telegram tool was perceived as the most preferred online tool in T&L and it received positive feedback in terms of effectiveness, academic engagement and students understanding. In conclusion, telegram has proven as an excellent tool for online T&L during the Covid19 pandemic.

Key words: face-to-face; online; Telegram; teaching strategies; learning outcome

Introduction

Rapid transformation in information technology has created changes in higher education in which it is seen that information technology including social media has been used as an important tool in teaching and learning (Nawi et al., 2015; Oliveira et al., 2018; Andujar et al., 2020). Social media such as Whatsapps, Telegram and Youtube are used in academic environments as tools to facilitate T&L approaches including sharing information, discussion platform, and quick access to information (Castro, 2014; Iksan & Saufian, 2017; Singh et al., 2020; Suryati & Adnyana, 2020). These tools are also more flexible, spontaneous and informal thus received wider acceptance by students (Al-Ammary et al., 2014; Hamid Shokery et al., 2016; Kitchakarn, 2016). Several studies have shown that telegram applications in education has gained positive impacts in T&L such as better learning outcome compared to conventional method (Mahdiuon et al., 2020; Suryati & Adnyana, 2020).

Nowadays, the online platform is accepted as a new norm across the world in ensuring continue access to attain quality education. UTM became the first university to announce that the Online Learning (OL) platform was fully implemented effectively on 1st April 2020 subjected to Movement Control Order (MCO) in Malaysia. The present study examines the significance of the Telegram adoption on evaluating academic engagement and performance of undergraduate students who takes the Traffic Engineering course in UTM. The results presented are based on my own experience in went through the paradigm shift from the traditional face-to-face (f2f) teaching and learning to OL before and during the Coronavirus disease 2019 (COVID-19) pandemic. To conclude, OL has paved the way in creating more comprehensive opportunity in terms of accessibility and outreach of education due to the cost-effective and time-management factors.

Project Objectives

The objective of the study is to evaluate the significance of Telegram-assisted online T&L on academic engagement and performance of third-year Bachelor of Civil Engineering students at the Universiti Teknologi Malaysia who registered in Traffic Engineering course.

NALI approach implemented in the research

Traffic engineering course is a compulsory course offered for third year students in School of Civil Engineering, Universiti Teknologi Malaysia. It has four (4) chapters for 15 weeks of academic sessions. The announcement of Movement

Control Order on 18th March 2020 in the mid-semester has urged UTM to enforce the fully online from the 1st April 2020 onwards. Hence, Chapter 3 and Chapter 4 of the Traffic Engineering course was conducted via online platform. Telegram applications was used as a medium to deliver the lecture of Chapter 3-Design of Signal Control. Telegram is a user-friendly application and requires low bandwidth, that perceived as acceptable in lecture dissemination especially to those students who have difficulty in internet connection and accessibility. Various T&L approaches were utilized using telegram such as poll, discussion and sharing lecture material as shown in Figure 1 below.

(a) Poll activity (b) Discussion and sharing materials

Figure 1: Teaching and learning activities in Telegram.

Students' academic performance were then evaluated based on CLO3 achievement. The description of the intended course learning outcome is shown in Table 1. The student's perception on the use of Telegram as a teaching tool was also evaluated.

Table 1: Course learning outcome.

No.	Course Learning Outcome
CLO3	Design, evaluate and analyse traffic control systems at intersections and highway geometry layouts for safe and efficient management of traffic.

Project Methodology

The sample of this study consisted of 96 students from two (2) groups of students who enrolled in Traffic Engineering course for semester 1 2019/2020 and semester 2 2019/2020 (during April-June Covid19 pandemic lockdown in Malaysia). The two (2) groups of students adopted different T&L approaches. Before Covid19, students for semester 1 2019/2020 adopted face-to-face T&L approach whereas during Covid19, students for semester 2 2019/2020 adopted Telegram-assisted online T&L.

T&L activities for students in semester 1 2019/2020 were conducted face-to-face. For the semester 2 2019/2020, due to the pandemic Covid19 which caused the lockdown in Malaysia between 18 March 2020 and June 2020, has prompted the online teaching and learning approach for half of the syllabus of Traffic Engineering course (Chapter 3 and Chapter 4) which started on 1st April 2020. Telegram application was used to deliver the content of the Chapter 3 which was the design of signal control. Both groups of students adopted e-learning system and were informed on the learning outcome (as stated in the course information) regardless of the different T&L approaches used for each group of students.

Comparative analysis was performed based on two (2) different T&L approaches: face-to-face versus Telegram-assisted online based on learning outcome. Statistical analysis using two-sample t-test was conducted to determine the significance of these T&L approaches on the students' performance in the CLO3 which reflects students' achievement in understanding the concept taught in Chapter 3. Questionnaire survey was then conducted for students in semester 2 2019/2020 (who adopted Telegram-assisted online T&L) to assess their perception on online teaching tool which include information of preferred online teaching tools, their general perception of telegram use, academic engagement in telegram and academic understanding in Chapter 3 Traffic Engineering course. The questionnaire used a Likert-scale with three (3) levels: agree, neutral, and not agree, in which the students were asked whether they agree with the good statement on each question.

Findings and Discussions

Based on the key performance indicator for CLO3, 18% and 22% of students achieved more than 65% marks for face-to-face (semester 1 2019/2020) and Telegram-assisted online approaches (semester 2 2019/2020) respectively. There is an increase of 4% in the CLO3 achievement in online using telegram approach compared to face-to-face. Further testing using statistical analysis using two sample t-test found that there is no significant difference between face-to-

face and online using telegram approaches (p-value ($t = 0.382 < t_{critical} = 1.983$, p-value = 0.765 > 0.05). Although student perceptions are important, the ultimate indicator of course effectiveness is the degree to which students reach the learning objectives.

Based on the questionnaire, it was found that most students preferred Telegram as a T&L platform (64%) compared to live conferencing (31%) and other methods (5%). Results for other questionnaires are tabulated in Table 2.

Table 2: Students' perception on Telegram.

Response	Percentage of students (%)		
	Perception on telegram	Academic engagement	Academic understanding
Agree	68%	69%	63%
Neutral	27%%	32%	35%
Not agree	5%	2%	29%

T&L approach using Telegram applications is perceived as effective because it allows students to actively participate during class discussion without experienced discomfort feeling. The students also agreed that academic understanding through Telegram is no difference with face-to-face approach.

This study evaluated academic engagement and academic performance between face-to-face and Telegram-assisted online approach. The results showed that adoption of Telegram in T&L has no significant difference in term of learning outcome compared to face-to-face approach. The use of Telegram also received positive feedbacks from students. The Telegram was found to be very promising in knowledge dissemination to ensure active involvement among students can be achieved during Covid19 pandemic.

Acknowledgement

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The Effects of Flipped Classroom on Primary School Students' Writing Performance In English

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Highlights: As the education world revolves to Education 4.0, flipped classroom is seen to be one of the learning approaches that best described the future learning. Flipped classroom transforms the conventional classroom by flipping the theoretical part to be done before the class and making the class to be student- centered and focusing to the practicality part of the lesson. The research objectives of this research are to design a flipped classroom approach to improve students' English writing performance and to investigate the effects of flipped classroom approach on students English writing performance. This study employed experimental approach to primary ESL students. The instruments used in this study are test and questionnaire. The findings show that the students had better writing performance after they went through flipped classroom. This study shows that flipped classroom had positive effects on primary students' English writing performance.

Key words: Flipped classroom ; writing skill ; ESL ; primary

Introduction

Writing skill is one of the productive skills in English besides speaking skill. The English Language Curriculum for Primary Schools was developed to equip pupils with necessary language skills to help them to communicate effectively and appropriately to the pupils' development level in a variety of contexts (Ministry of Education, 2015). According to the Curriculum and Assessment Standard Document for Year 6, the writing curriculum seeks to develop the ability of pupils to write for different purposes and contexts and to deliver a variety of texts through a variety of media using proper language, style and type.

Despite the detailed plan on what the pupils should achieve by the end of primary schooling, their writing performance was not up to par. Nesamalar, Saratha and Teh (2001) emphasised that Malaysian students are found to lack writing skill. Thus, teachers need to utilise different methods and approach in teaching writing skills to the students for better understanding and learning (Chow, 2007; Graham, 2007; Kong, 2005), such as flipped classroom.

Innovation Objectives

1. To design a flipped classroom approach to improve students' English writing performance
2. To investigate the effects of flipped classroom approach on students learning performance

Novelty

Selecting and using correct curriculum and learning materials is necessary to draw learners ' interest in learning and using language in and out of the classroom (Fewell, 2010). It is believed that ICT integration in teaching writing could be efficient in improving students' writing performance and their motivation in writing. One of the methods in integrating ICT in the classroom is by implementing flipped classroom.

Nonetheless, there were limited studies on flipped classroom that focus on primary ESL students. Moreover, there is also a lack of studies of the implementation of flipped classroom in teaching writing performance. Although there were some studies investigated on the students' motivation by using flipped classroom, they were mainly focused on university students. Therefore, this study intends to fulfil these gaps by developing flipped classroom writing module and investigating the implementation of flipped classroom in teaching writing and its effects on student's motivation.

Creativity and Innovativeness

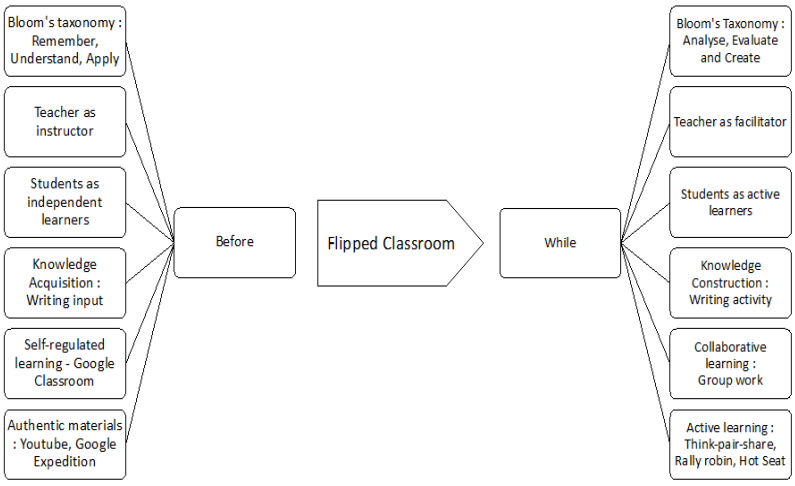

Figure 1 : Conceptual Framework of Flipped Classroom Writing Module

The figure above shows the conceptual framework of flipped classroom which becomes the foundation for the flipped classroom writing module. There are two parts in a flipped classroom setting. The teacher needs to provide authentic materials before the class, such as lecture video about the topic that they are going to learn. Supplementary video link from www.youtube.com can be provided for the students to watch as additional materials. This activity describes the teacher's role as an instructor. The teacher will provide the students with instructions for the task before the lesson that they need to do. The students' act as an independent learner as they only need to watch the video and follow the teacher's instruction. This corresponds with Bloom's Revised Taxonomy, which involved remembering and understanding skills.

Applicability

- Applicability to students

Students will have the chance to experience different learning method through the utilization of flipped classroom. Flipped learning can improve students' academic achievement as proven by past researches (Law,2014). Students may go through a collective discovery process and learn how to delegate tasks and take responsibility for their learning. The use of technology in which students watch videos to gather additional resources before the class prepares them for the future. This is similar to active learning where they are no longer a passive learner, with the teacher's instruction; they must participate actively in the class.

- Applicability to teachers

As we are preparing the students for the 21st century, Teachers need to train and update themselves with the latest technology and advance their teaching method. Hao and Lee (2016) suggested that teachers must acquire knowledge of technical, pedagogical materials to keep up with rapid technological changes. This research will provide teachers with the basics of flipped classroom lesson design. Preparing the materials for flipped classroom might seem arduous for some teachers as they are already burdened with other duties, but it actually lightens their burden as the teacher is just a facilitator in flipped classroom environment. Teachers usually have difficulty maintaining students' attention in classrooms during lecture lesson (Pinto et al., 2012).

Impact

Students' writing performance and motivation have improved after the implementation of flipped classroom. Students have ample of time to practice writing activity in the classroom with teacher as facilitator and students as active learners. Teacher able to integrate Higher Order Thinking Skills, 21st century learning skills and technology in the lesson to prepare the student for IR 4.0. The students have more autonomy of the lessons since they can choose when, where and how they want to learn. Students able to communicate and collaborate with the peers through the use of Google Classroom and group work.

Research Methodology

The sample of this research Year 5 students. This research is quantitative research, thus the instruments that was employed in this research is writing test. Writing test gauged the students' English writing performance. The researcher followed the format from English Writing Paper in Ujian Pentaksiran Sekolah Rendah (UPSR). Pre-test was conducted before the implementation of the flipped classroom module. After eight weeks, the researcher employed post-test. Then, the researcher analyse the data using sample t-test.

Finding and discussion of the innovation

The effects of flipped classroom towards students' learning performance

The result for sample t- test for experimental group is (M=-16.97, SD=7.12) conditions; t(28)=-12.825, p = 0.000. It can be observed that there is significant difference from pre-test to post-test in students' performance. The researcher also utilized Self-determination Theory questionnaire to gauge the students' motivation in the writing class. There was a significant difference between pre-questionnaire and post-questionnaire of experimental group (M=-1.05, SD=0.47) conditions; t(28)=-12.002, p = 0.000. The results demonstrate that the students who experienced flipped classroom approach had improvement in motivation according to Self-determination Theory.

Acknowledgement (if any)

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Massive Online Teaching & Learning for Cartographic Subject

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Highlights: Online teaching and learning allow educators and students to have an interactive learning environment which are conducted in virtual world. As aligned to the Malaysia Online Learning Blueprint 2015-2025 (Higher Education), Shift# 9: Globalised Online Learning, this medium can provide competent course delivery and enhance the quality of Malaysia education. Universiti Teknologi MARA (UiTM) is one of the higher education institutions that applied this medium of study. Parallel to the UiTM initiative, this project aims to design an interactive online teaching and learning of Cartography. The implementation of this online learning activities is integrated with UiTM online platform (ufuture) and the open sources software including H5P, Google Classroom and kahott in the development of this courses. Learning and teaching activities using video recording, interactive activities, open discussion to attract students more interesting to learn about cartography. This open learning courses is flexible and short online courses, designed for exploring a new subject, trying out a new learning activity and acquiring new skills, it could help any learners to learn more about cartography.

Key words: Cartography; Online Learning; Open source software,

Introduction Innovation Product

Cartography is the fundamental geographic discipline of mapping. This course deals with mapping fundamentals, conventional practices, established design considerations and contemporary theory associated with modern cartography which cover during lecture session. Laboratories exercise more focus on practical application of cartographic theory in the design and production of maps using computer graphic software

GLS362 Principle of Cartography is one of the main subjects in AP120 Diploma in Science Geomatic program in UiTM. This subject is compulsory in completing the diploma program, which expose student on the use of modern and conventional mapping technology for mapping purposes.

The main objectives of this online learning courses are:

i) Online medium for learning process of cartographic subject
ii) As a platform learners and instructor to share knowledge and idea interactively.
iii) Development interactive learning activities and assessment for this course.

Content (Project or Innovation)

Current higher education landscape is significant changes due to the rapidly technology evolution process which also give impact to the landscape and the way of taught and in the way how the students learn. In line with the

development of current technology the implementation and adapting modern education methods will allows teaching and learning process can be done anywhere, anytime (European Comission, 2014).

The development of online learning for cartographic subject has successfully enhance the way on how this course had been delivered. With the combination of the UiTM online platform, which is ufuture.uitm.edu.my offers a great opportunity for online teaching medium. It is one stop center for educator and student to interact, it also provides a medium for integration with other open sources software and application. H5P, Google Classroom, Padlet and Kahoot application successfully integrate with this platform for interactive learning activities. Students are able to search and get full information in terms of lecture notes, sharing video, quiz, discussion room and so on. The phenomena of pandemic covid-19 have encouraged online distance learning to be executed. Therefore, to ensure the objective of online distance learning to be achieved, an interactive learning tools is expedient enough in this rigorous learning process. For higher education, interactive learning tools has been widely used and implemented. This product is creatively developed through UiTM online platform, which enable direct assessment to be done after each of the learning activities enrolled by the student.

Research Methodology

This system interacts directly where students are automatically enrolled to this platform once they registered to this course. The design process starting with the development of course content for every subchapter and followed by the creating and develop the learning activities in open learning website/application (H5P, padlet etc.) as shown in figure 1.

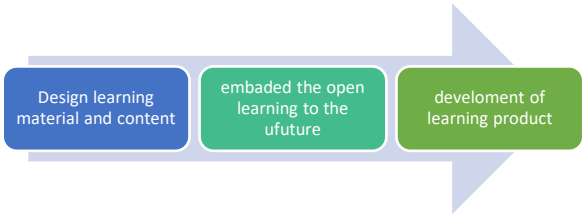

Figure 1: Methodology flowchart

The design of the learning activities consist of several elements such as slide presentations, videos related to the topic in the course, crossword puzzle, fill in the blanks, essay, and also platform to discuss with the instructor (lecturer) as shown in Figure 2. Each of the activities included can be enabled for tracking the students' progress. This platform also enables other medium of tools to be included in learning activities.

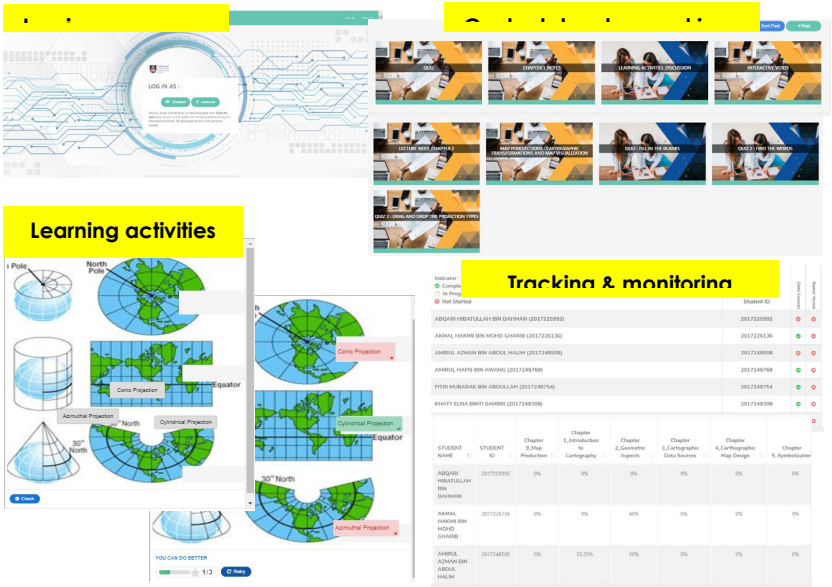

Figure 2: Learning activities interface and assessment

Impact, applicability, innovativeness, and novelty

The representation of the material uses in this product take account the deepness in virtual perception of the viewer (students). Colours, symbols, character used in the slide presentations, videos, and learning activities aligned with the requirement of viewer need to understand and build knowledge understanding. Hence, the objectives to deliver information and construct deep learning is accomplished.

Online learning usually relates to the connectivity of the audience and instructor to be less effective. However, this product is applicable as it has the ability to track and monitor the progress of the students actively. The functionality of the platform use allow instructor to give direct assessment to the students and real time discussion is available. Moreover, the instructor able to give comment on the task given and even update on the latest assignment. The access to this platform is unlimited to all the registered students under UiTM system. This user-friendly platform, in addition enable multiple instructors to join in a classroom.

The development of online teaching and learning give opportunity to experiments with blended learning, a well-researched strategy for improving active learning in residential courses. Team-based course design. creating online teaching and learning requires people across the institution to collaborate in ways not native to higher education. Online teaching and learning also have a significant and give direct impact on higher education by developing students' skills and development

In a nutshell, teaching and learning become easier especially for young generations in line with the technology involvement. On the other hand, knowledge can be learned or shared at anywhere and anytime by educators, teachers, and learners. As mentioned by John F. Kennedy, the goal of education is the advancement of knowledge and the dissemination of truth.

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FABU Students' Lounge: The Creative Synergy Learning Culture

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Highlights: The FABU Students' Lounge project is a learning innovation through the formation of 'Creative Synergy Learning Culture' (CSLC) where students have the opportunity to learn and gain real experience through the synergy and collaboration project between FABU staff and students. This project is an initiative to form a creative and immersive learning culture in line with the 21st century learning based on Incidental Context Based Learning (IC-BL) the innovative learning strategies for Modern Pedagogy from the combination of Context-Based Learning and Incidental learning. This CSLC is the endeavour to develop synergistic culture amongst the students, cross disciplinary understanding and mutual respect within built environment realm.

Key words: Synergy; Project Based Learning; Context-Based Learning; Incidental learning

Introduction

The FABU Students' Lounge is a live project designed to expose students to a live design development and execution in a controlled environment. Students immerse themselves in the project, playing various roles throughout, while building and developing their own understanding and skills in performing specific tasks. FABU Students 'Lounge was inspired by the former Dean of the Faculty of Built and Surveying (FABU), Prof. Ts. Dr. Mohd Hamdan bin Ahmad since the beginning of 2018. Project Leader, Dr Norliza binti Mohd Isa, Senior Lecturer in Landscape Architecture was appointed in March 2019 to lead the design and construction process.

What is interesting about this project is the effort to mobilize the energy and skills of more than 50 FABU students from various program backgrounds together with more than 20 FABU staff consisting of academic and support staff. Apart from that, UTM alumni and retirees have also been involved through donations in terms of money and goods (in-kind). Among the staff who are directly involved in the success of this project are Mr. Abdul Jalil bin Maulani (Deputy Registrar), Ms. Zaleha binti Tajip (Assistant Accountant), Mr. Nurul Amrie bin Abdullah (Senior Assistant Registrar), PM. LAr Dr. Sapura binti Mohamad, Sr. Dr. Fara Diva binti Mustapa and many more. The construction of the FABU Students 'Lounge is to fulfill the goal of providing restrooms and student activities. There are four (4) elements of space in the design namely; (1) lounge and discussion room, (2) kitchen and dining area, (3) business space and (4) multipurpose space that can be used for 21st Century Learning activities as well as leisure activities for students.

To realize the desire and spirit of Synergy, FABU has appointed Lecturer En. Azari bin Mat Yasir in producing a visual impression and initial design of the student space. FABU next appointed Senior Lecturer in Landscape Architecture, Dr. Norliza binti Mohd Isa as the Project Leader to redesign and realize FABU's intention in providing student's space to do cross synergy activities. The resulting manifestations such as the Executive Lounge of students have led to the name FABU Students 'Lounge and it was agreed during the Executive Committee Meeting - Bil.2 / 2019 on 7 March 2019. FABU Students' Lounge was introduced and informed to YBhg. UTM Vice Chancellor during the Vice Chancellor's Friendly Session with FABU Citizens on 24 February 2019 and Roadshow Student Affairs (HEP) by the Deputy Vice Chancellor (Student Affairs) on 23 April 2019. Since the students are also the recipient and user of the outcome of the project (The Students' Lounge), they have vested interest to see the proper outcome of the project. Any decisions they made during the development process will affect and alter the way people use the Lounge. This help student hones their design skills to better use their decision-making process in the future.

Innovation

This Creative Synergy Learning Culture (CSLC) the endeavour to develop synergistic culture amongst the students, cross disciplinary understanding and mutual respect within built environment realm. The objectives are:

1) To expose students to live project development and execution
2) To enable students to learn via immersive participation and coordination
3) To inculcate the ability to self-learn and reflect from an on-going project

This project inculcates new learning culture through synergy and creativity. Using this method, students not only able to obtain real-world, practical experience, but they also able to make decisions on the expenditure of the project. This enabled a reduction of cost of over 50% of the original expected budget.

Incidental learning is unplanned or unintentional learning. It may occur while carrying out an activity that is seemingly unrelated to what is learned. Early research on this topic dealt with how people learn in their daily routines at their workplaces. However, it may trigger self-reflection and this could be used to encourage learners to reconceive what could otherwise be isolated learning fragments as part of more coherent and longer-term learning journeys.

Context-Based Learning enables the students to learn from experience. By interpreting new information in the context of where and when it occurs and relating it to what we already know, we come to understand its relevance and meaning. In a classroom or lecture theater, the context is typically confined to a fixed space and limited time. Beyond the classroom, learning can come from an enriched context such as visiting a heritage site or museum, or being immersed in a good book. By conducting this project, the students gained the opportunities to create context, by interacting with the surroundings and understand the context by exploring the setting, supported by guides and from the instructors

One of the unique advantages of this project is students get hands-on involvement in the development and execution of a project that they themselves will use in the future. The learning process in the project is not limited to the scale and time-frame of the project itself, but extends beyond completion. Students will have the opportunity to observe and study how other students use The Lounge, and later suggest improvements or alternatives as part of the life-long learning process.

Impact to Students' Learning

This project enables students to work cooperatively and collaboratively in a real-life project. Previously they have been working together in groups on theoretical studies, but having the opportunity to do the same in a live project adds another layer of complexity, one that the students need to learn quickly and adapt. The project also offers a unique experiential learning, something that the students could not obtain from books or the internet. The skills they've obtained, although still at novice level, forms the foundation for their own learning in the future.

Table 1: Sample of Learning Outcome and Student's Reflection on FABU Students' Lounge Project

No.	Students	Reflection
1	Chung Ze Xuan (A18BE5111)	From this project, I had learned a lot of construction knowledge through the practical work. For example, I learned how to weld the steel which I never do it before in my life. I also taught to be careful by wearing the safety helmet, ear protection and gloves while welding the steel. It was a great experience to me as I can participate in this project with my course mates. I had learned to collaborate with others to make this project successful. I think that it was important to have the practical construction work in the learning process, this is because the practical work can strengthen the impression of the knowledge and the process of the construction work which may be helpful in our future career. Lastly, I hope that we still have the chances to conduct and participate in the practical construction project in the future.
2	Ng Minn Er (A18BE0099)	From this construction practical, I have learned a lot of things such as how to cooperate with my friends and how to paint on wood panel in a correct way.
3	Joathy A/P Arul Kaandan (A18BE0044)	This session has helped me to gain more knowledge about painting on wood and metal. Right from the type of paint to the type of brush that is used during the painting process is definitely something that we will not get without experiencing nor on books. This experience that we got from the people with a lot of knowledge about construction methods is very valuable. Our contribution towards this project is something that I would personally cherish and look up to.
4	Nisha Aqilah Uzma Bt Mohd Shaharuddin (A18BE0102)	I have learnt a lot more than I thought I would, on this construction practical experience. Because this was a road that we were working on, and not a building (as it we would in class), I had my doubts as to how relevant this would be to me and if beneficial at all. I was proved wrong. Being on site does make a difference. When things learnt in class become more than theory, understanding comes a lot easier and better. I watched the workers use machines to join steel blocks (welding) and for the first time, I got to see and handled by myself in welding

		process that we had talked in class before. It was only after being on site that I understood the whole process. This practical experience in construction was a success afterall and proved to be extremely vital for learning purposes. The University does offer good theoretical teachings, although some things can only be learnt on site.
5	Nicholas Yong Jia Fu (A18BE0100)	WHAT I HAVE LEARNED? During the painting process, I have learned how to paint the wood board evenly because sometimes I applied too much paint to a section since the paint is so thick. Sometimes I painted against the wood grain in order to more easily cover a section, but I always made sure that my final strokes were in the direction of the wood grain. SAFETY GEAR Before welding process started, I weared a welding mask to protect my eyes from the light that generated by welding. Secondly, I weared gloves and leathers to protect myself from molten metal splattering off of the work piece. Thirdly, I weared boots to prevent get burned by the hot metal. WELDING PROCESS With the machine set to the correct heat, wire-feed, and gas flow, I started to run the weld bead. I hold the welding tip about 1/2-3/4" above the parent material and begin moving the weld gun along the joint. When the weld gun was in a correct position and the machine is set-up correctly, begin by squeezing the trigger and build the weld pool up. Once the weld is the desired size begin to drag or push the weld-pool along the joint. CUTTING PROCESS Furthermore, En. Zahri, the principal of the workshop have given me some instruction of using the circular saws to cut the aluminium frame. Before starting, I chose a standard sized circular saw which uses a blade between 5 and 10 inches because usually it is suite for cutting metal. Next, measure along the piece, and then mark the cut lines in pencil. Use a tape measure to make an initial small notch with pencil, and then use a square or ruler to score the perfectly straight cutting line. Thirdly, I adjust the cutting depth and bevel angle on circular saw as required for the cut. Next, push the saw through the material with enough force to keep it moving, continue the whole way through your cut, and finish it cleanly along your cut line. After the cut is complete I will make sure that the blade guard slides back into place.During the welding and cutting process, I have learned the process step by step from first until the end such as choosing the suitable materials and tools, marking, welding and cutting. I also learned to be careful when I am using the tools because it can cause injured if we did not use carefully. As a result from the FABU Student's Lounge project, I have learned a lot of skill and techniques such as chalk painting, latex painting, welding and cutting materials. I have also pickup some information and detail of the tools in the workshop that I did not seen before. On the other hand, landscape archtecture students had experience the spirit of teamwork and discipline. I am truly thankful to our Lecturer, Dr.Norliza binti Mohd Isa, Dr, Zanariah Jasmani and the principal of workshop, En.Zahri Abdul Jalil for giving us the opportunity to participated this programme.

Conclusion

In this FABU Students' Lounge project, students were given the opportunity to get involved in the design, development and construction of a live project which they themselves will use in the future. This allows them to observe and reflect on their product as part of their own life-long learning process. Students, Academic Staffs and Support Staffs work together in a live project, each with unique role and task. Over 50 students take turn to participate in a hands-on task, allowing them to put to use all the theoretical knowledge that they have acquired before. Each decision-making process will have a unique effect on how the space will be used in the future, so the students must exercise their understanding and critical thinking process to good use. This project would set as a template for future programme in FABU to enable students to get involved in a live project to learn and gain experience from it.

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Enhancing Students' Creative and Critical Thinking Using Reuse, Reinvent And Reduce - Creative & Critical Camp (3r3c)

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Highlights: Experiential learning has been acknowledged to be a successful antecedent of creativity and critical thinking skills. It allows learners to recognize, accepting, respecting, and applying the knowledge gained from learning activities. Students who exposed to experiential learning were reported to possess higher level of commitment, and greater interest and desire to learn. For this reason, the authors designed a service learning program with an adoption of experiential learning model as means for fostering students' creative and critical thinking abilities. The authors implemented this program in a group of primary school children in Sekolah Kebangsaan Kangkar Pulai 2 (SKKP 2), Johor Bahru. Students were divided into small groups to complete creative and critical thinking tasks through multiple activities including games and interactive prototype. Eventually, students were encouraged to invent one creative prototype using recyclable items and to showcase their work in a competition. Overall, the program encourages students to generate ideas, planning, analyzing, decision making, problem solving and evaluating. High intellectual skill is applied in producing prototypes based on environmental sustainability.

Key words: Creativity thinking ability, critical thinking, service learning, experiential learning, primary school children

Introduction

Service learning (SL) has been said as an impactful teaching and learning method that fosters social responsibility and transform classroom learning into meaningful community service. SL has also been found to have a significant impact on students' learning. In similar vein, empirical evidence exists on the contribution of experiential learning in the development of critical thinking and creative thinking abilities (Bell, Kanar, & Kozlowski, 2008). Hence, the authors designed a SL program according to experiential learning cycle that comprise of four stages: reflective observation, abstract conceptualization, active experimentation and concrete experience. The SL program was organized with a group of primary school children (aged 11) aimed at enhancing their creative thinking and critical thinking abilities. The SL program was named Reuse, Reinvent and Reduce - Creative and Critical Thinking Camp (3R3C) as to spread awareness about recycling and environmental conservation among primary school children. This program was organized in 2019 and learning activities were divided into three phases (Phase 1: Games and Interactive Prototype; Phase 2: Mentoring; and Phase 3: Exhibition). Participants were given opportunities to showcase their creativity and critical thinking abilities through product innovation. Using the experiential learning approach, the participants were guided to discuss environmental conservation issues in the community. Besides that, the program stimulates the participants' interest in creativity and product innovation through multiple learning activities such as games and interactive prototype. A new learning experience was created through exhibition to further strengthen students' abilities, and thinking skills. This program received a tremendous support from teachers, parents and the Parents and Teachers Association (PIBG). A total of 284 primary school children from SKKP 2 participated in this program. They completed the pre and post self-reflection questionnaire as outcome measures. The result shows a positive change in terms of participants' awareness of the use of recyclable items and interest in creating new stuff using recyclable items. This program can be replicated to other primary school if we wish to foster thinking abilities among young generation.

Content

Background of the research

Creativity and critical thinking abilities has been recognized as essential twenty-first-century skills (Ahmadi & Besançon, 2017). Young generation needs to be creative and critical to be able to adjust to new circumstances and fast-changing environment (Nikkola, Reunamo & Ruokonen, 2020). Creativity helps to solve problems that cannot be solved from other points of view (Stuhlfaut & Vanden Bergh, 2014). It deals with a process for generating ideas, a process of reinvention and redefinition that aims for reaching original solutions. Similarly, critical thinking is important for problem solving and decision-making (Halpern, 1999). Critical thinking helps to identify and defying assumptions, to conduct contextual analysis, and to explore different courses of action (Brookfield, 1987).

The literature has argued that certain abilities cannot be achieved under the traditional teaching models suggesting that new teaching model is needed. Given this, experiential learning has been proven to be a successful trigger of creative thinking skills (Ayob, Hussain, Mustafa, & Shaarani, 2011). Hence, this research designed a SL program according to experiential learning approach with an aim to stimulate creative and critical thinking abilities among participants. The impact of the program was measured using quantitative analysis. Data was collected using a pre and post questionnaires.

NALI approach implemented in the research

As already mentioned, this research adopted experiential learning approach (one of NALI approach) to foster the participants' creative and critical thinking abilities. Experiential learning is a process through which knowledge is created through the combination of acquired experience and the potential discovery in an individual's learning process (Kolb, 1984). The approach allows learners to recognize, readily accept, respect, and apply the learned knowledge and abilities (Cheng, Huang, Yang & Chang, 2020). The experiential learning impact on the development of multiple abilities is evident in past studies (Bell, Kanar, & Kozlowski, 2008). Experiential learning has also been proven to influence higher level of commitment and desire to learn among students (Lovelace, Egger, & Dick, 2016). As shown in Figure 1, this program was conducted in three phases (Phase 1: Games and Interactive Prototype; Phase 2: Mentoring; and Phase 3: Exhibition).

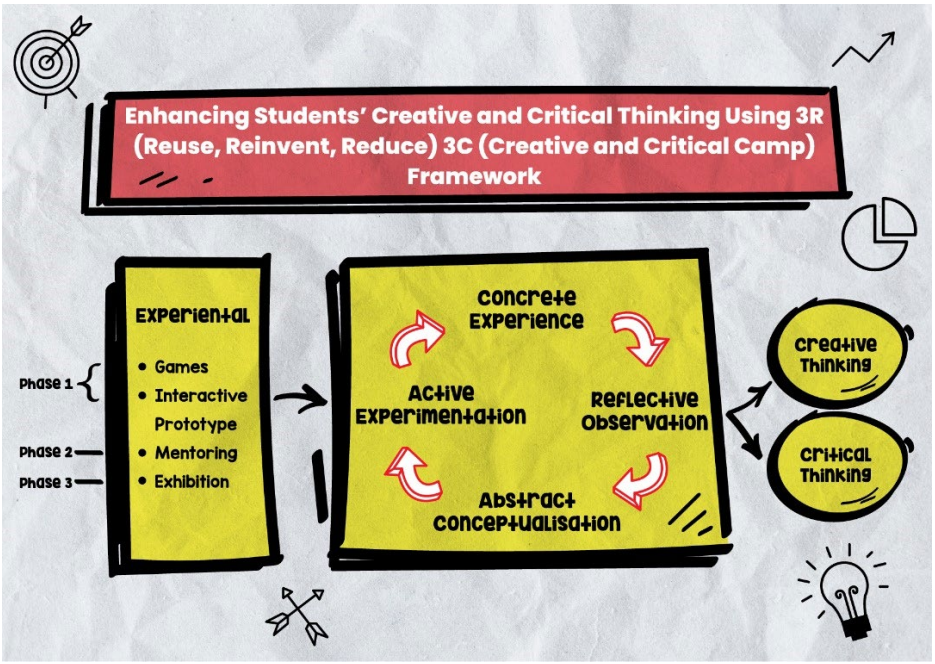

Figure 1: Enhancing Students' Creative and Critical Thinking Using 3R (Reuse, Reinvent, Reduce) 3C (Creative and Critical Camp) Framework

In accordance with the Kolb's experiential learning cycle, our program began with creative games and interactive prototypes demonstration (Phase 1) that provide students with new learning experience. Mentoring session was conducted in Phase 2 where students presented their idea and produce an initial prototype using the reuse, reduce and reinvent concept. In this phase, the authors acted as facilitators and provide feedback on the prototypes presented. The activity allows students to reflect on what they experienced in Phase 1, analyzing and modifying the existing concepts and come out with new idea. An eco-green exhibition was conducted in Phase 3 in collaboration with the SKKP2. Among the products displayed by the students in the exhibition are bookshelves, stationery containers, multi-purpose containers, bags, and toys. Overall, the learning activities in Phase 2 and Phase 3 allow students to plan and to try out what was learned, thus enable them to apply the new knowledge to other situations.

Methodology

The authors used a quantitative research approach in this study. Data was collected using questionnaire. Data was collected at three different point of time. Time 1 data collection was carried out before program in Phase 1: Games and Interactive Prototype. Students were required to fill up a set of questionnaire form asking about their awareness of reuse and recycling, and their interest towards inventing stuff out of recyclable items. Time 2 data collection was done at the end of program in Phase 1 Games and Interactive Prototype. Students were asked to complete the same set of questionnaire form. The objective of Time 2 data collection was to identify any significant change in students' awareness of reuse and recycling items after program. Our third and final data collection (Time 3) was collected after the whole program completed approximately four months after first data collection (phase 3: Exhibition). The same questionnaire (Time 2) was used. Data was analyzed using descriptive statistic (mean score).

Finding and discussion of the research

Table 1: Programme assessment conducted through analysis based on questionnaire

PROGRAMME ASSESSMENT	
Analysis based on questionnaire (before and after the programme is conducted)	
TIME 1	**TIME 2**
Overall, the level of students' awareness of the use of recyclable items is moderate. The interest and inclination towards creativity to produce products from recyclable items is also at a moderate level. The overall mean is 3.40.	Overall, data analysis showed significant improvement for the three phases of the study. This is based on the overall mean score which increased from 3.40 (before the program) to 3.55 (after the program) next to 3.86 (4 months after the program). This means that there is a positive change in terms of awareness of the use of recyclable items as well as students' interest in creating something new using recyclable items, especially toys. Specifically, students have an awareness that used items such as bottles and boxes can be combined to produce a new product based on an increase in mean scores from 3.70 (before the program) to 4.43 (after the program) and 4.70 (4 months after the program). Students also agreed that new items could be produced from a combination of used items such as paper, rope, and plastic (M = 3.33, before the program; to M = 4.16, after the program). And their level of awareness sustained 4 months after the program (M = 4.10). In addition, students' self-confidence to create something new also increased based on the increase in mean scores from 3.05 (before the program) to 3.25 (after the program) and 4.00 (4 months after the program). Students stated that they enjoyed playing with used items such as ice cream sticks and bottle caps (M = 3.75, before the program; M = 3.99 after the program; M = 4.23, 4 months after the program). Students also agree that used items that have been modified into new items can be sold. This is based on an increase in the mean score from 4.12 (before the program) to 4.18 (after the program) and 4.23 (4 months after the program).
TIME 3	
The community (SKKP 2 students) sustained creativity and critical thinking based on a mean score of 4.86 after 4 months of the program is completed.	

Conclusion

As a conclusion, the program allows student to recognize, accepting, respecting, and applying the knowledge gained from learning activities. This program proved that students who exposed to experiential learning were reported to possess higher level of commitment, greater interest, desire to learn and spread awareness about recycling and environmental conservation. This program should be conducted again in future.

Acknowledgement

We are grateful to students, teachers, Headmaster, and the Parents and Teachers Association (PIBG) of SKKP 2, School of Human Resource Development and Psychology, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia for the support for the team to conduct this service learning program.

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Sustainable Entrepreneurial Mindset Showcase (SEMS): An Integrated Action Based Competition

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Highlights: Basic entrepreneurship course is compulsory for all Higher Learning Institutions (HLIs) in Malaysia and this course serves as the means to develop awareness and proper understanding of the concept of entrepreneurs and entrepreneurship. This Program aimed to introduce a program called Sustainable Entrepreneurial Mindset Showcase (SEMS), which has been implemented since Session 2018/2019 Semester 1 to UTM students undergoing the Introduction of Entrepreneurship UHAK/UBSS1032 course. SEMS integrates the elements of United Nation Sustainable Development Goals (UNSDG), Business Modelling, Prototyping, Pitching and Digital Video Publishing. The program has impacted students particularly in sensing innovation opportunity, prototyping and pitching. Based on a post-survey of 302 students, students agreed that they are confident to express their ideas, the program transformed them to becoming more creative and more confident in prototyping.

Key words: List three to five keywords, each separated by semicolons (;) Entrepreneurship Education; Sustainable Development Goals; Business Model Canvas; Prototyping; Showcase

Introduction

With the advent of the fourth industrial revolution (4th IR), Malaysia has aggressively embraced new and emerging technologies to gearing up for future jobs. Understanding the needs of nurturing global and holistic talents, the Ministry of Higher Education (MOHE) has highlighted that innovation and entrepreneurship as the new pathway for young graduates. Indeed, the country will regard the students' innovative products and services as the main focal point in generating new graduate technology entrepreneurs (start-up). Undeniably, many graduates are capable of crafting brilliant and creative ideas; however, they lack knowledge of developing the business idea into a prototype and eventually commercializing the business idea and prototype into the real world as an innovation-driven entrepreneur.

Under the UTM's New Academia Learning Innovation (NALI) initiatives, the concept of entrepreneurship is emphasized. The aspect of entrepreneurship refers to the context of learning that is more productive, creative, and innovative. Therefore, UTM Centre for Student Innovation and Technology Entrepreneurship (UTM XCITE) started to revolutionize the delivery of 'Introduction to Entrepreneurship' course for undergraduate students (UHAK/UBSS 1032) through its impactful program called 'Sustainable Entrepreneurial Mindset Showcase (SEMS)' starting Semester II 20182019. This program aims to nurture and encourage the students to be innovative and entrepreneurial, and a global-ready player by embedding highly practical learning modules and teaching approaches. The students also need to be nurtured as an entrepreneurial leader in the future, and hence, an understanding of the 17 pillars of Sustainable Development Goals (SDGs) is crucial.

Approach

United Nation Sustainable Development Goals (UN SDGs)

The United Nations 17 Sustainable Development Goals (SDG) was introduced with 169 targets generated between them. Figure 1 showcases the 17 SDGs which so critical for the whole world, hence every student of UHAK/UBSS1032 course are required to comprehend and recognize opportunities aimed for their entrepreneurial project. Students are expected to figure out issues, sensing problems, identifying potential solutions and brainstorm within groups to choose their agreed solution (value proposition), and should be actionable within a specified context. For instance, students who chooses SDG No12: Responsible Consumption and Production would have a better understanding of achieving a fully sustainable consumption and production patterns. They are probably looking at reducing waste generation through reusing and recycling of material such as fabric. An example of an opportunity is the development of reusable bag, where the agreed solution here would be developing a customized design reusable bag from discarded fabric or material.

Figure 1. An overview of 17 Goals that are to Transform the World (http://www.campaign.exchange/campaigns/sustainable-development-goals/)

Business Modelling

Business Modelling is a process of representing an organization or enterprise business processes, and it ranges from the operational level of the processes up to the strategic level. There are many tools available to elicit the processes, however one that became very established is Business Model Canvas or BMC by invented by Osterwalder and Pigneur, 2013) as in Figure 2. The BMC consists of nine building blocks that are grouped into the Customer Focused (Value Proposition, Channel, Customer Segment and Customer Relationship), Organization Focused (Key Resources, Key Activities and Key Partners) and Revenue/Cost (Revenue Stream and Cost Structure). The main idea of the BMC is to assist entrepreneurs particularly start-up that are defined as an organization which is searching for the right business model, which specifically means repeatable and sustainable business model (Blank, 2007)

When we look at the flow of information and idea, students who had recognized the opportunity and solution centred on the 17 SDGs stated in the previous sub-section, the proposed solution must go through the review using BMC. Here, students would be able to refine their products by looking at the fit between their products Value Proposition and Customer Segment chosen. The whole 9 blocks are being analysed through this canvas and validated.

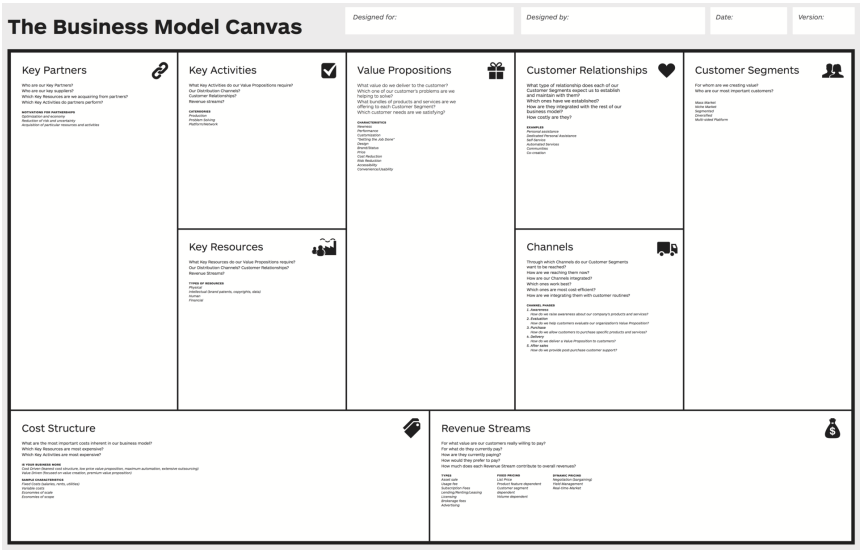

Figure 2. Business Model Canvas (Osterwalder & Pigneur, 2013)

Digital Prototyping

Prototyping is just one familiar word used among engineers, software developers and product developers. However, since illustrating or showing a sample or model is crucial, entrepreneurs must learn to practise prototyping. Prototyping has become a pre-requisite not only intended for ideation among the entrepreneur and their team members, but also the means to gather feedback, observations and even critiques from prospective customers. Ries (2011) emphasised that the philosophy of prototyping is to communicate, feedback and decision. This reduces the failure of customer

rejection (Maurya, 2012). Prototyping can potentially accelerate the entire process of new product development (NPD), enabling a high level of customer involvement and hence new product success (NPS) (Tih, Wong, Lynn and Reilly, 2016).

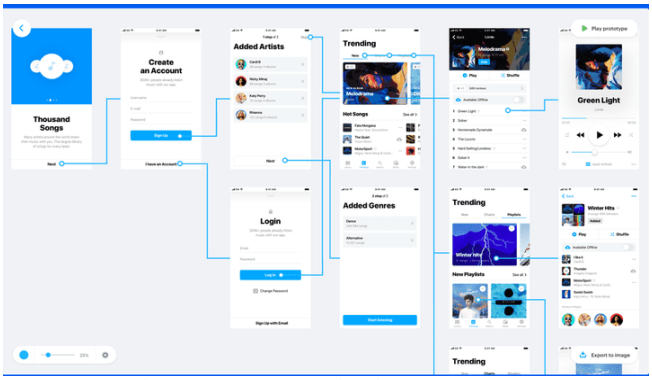

Figure 3. Storyboarding in marvelapp.

In this SEMS program, students are required to develop their idea into prototype specifically utilizing digital prototyping tools. Several prototyping tools that involves critical processes like storyboarding and wireframing were provided to them. For example, https://marvelapp.com/, http://proto.io/ just to name a few. Figure 3 visualizes the story board in marvelapp and Figure 4 is a snapshot of proto.io.

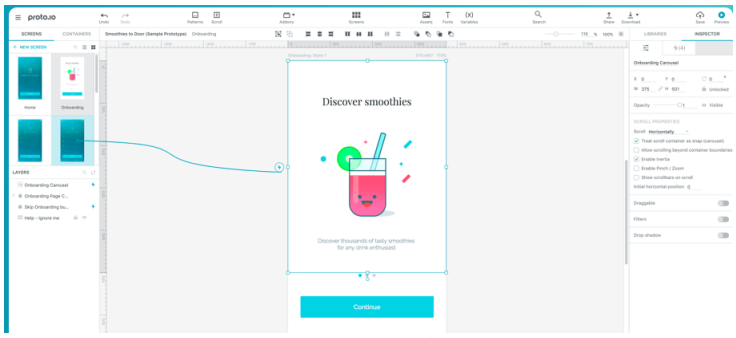

Figure 4. Snapshot of proto.io

Pitching

In entrepreneurship education, pitching is a process of delivering the value proposition statements that are intended to hook attention, providing data to warrant the needs and wants, presenting the proposed solution, reporting attempts by rivals and requesting call to action from their audience. This is central to bring across the intended messages to the audience. Clark (2008) has grouped the different types of pitching ranging from a 1-5 minutes called "elevator" or "pocket" pitch and to the longer version of 15-30 minutes pitch, so called the "typical" pitch to a broader network of angels or venture capitalist.

The pitching duration in SEMS is a maximum of 4 minutes and delivered via a recorded video. Due to the RMO, the recorded video pitch was uploaded to YouTube and the URL is then submitted to the organizer. Although having a video pitch offers better clarity particularly by enabling repeated and countless views, this however presents another level of challenge for the students. The challenge is the skill to edit and publish video contents, not merely presenting the "pitch", but also to cater the interchanged between presenter's viewpoint, data and statistics as evidence and the possible combination of multimedia.

Video Publishing

Due to the new demands of Video Pitching, aligning with RMO directions, students must have at least fundamental skills in the editing and publishing of video contents. Video editing tools could produce nearly professional output yet free of charge are available and students are given the freedom to choose them. However, students are reminded to always be very careful and not to infringe on any copyright and claims. Violating copyrights will cause the video to be blocked by YouTube (Figure 5) and this often affect the assessment process as the video may not be available during judging. As part of awareness to students, intellectual property rights are part of the contents delivered in the UHAK/UBSS1032 course.

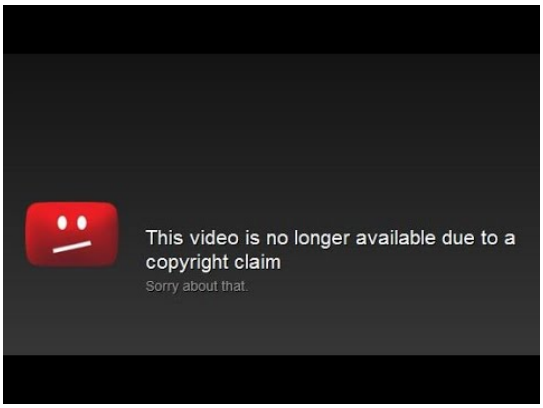

Figure 5. YouTube Video Blocked

To enhance the ability to be found in YouTube and the Internet, students are required to add metadata within the video pitch. This includes the file name, title, description and tags (Figure 6). Even when the YouTube URL is provided during submission, it is essential to ensure that the video is searchable not only by the organizer but anyone keen to learn about SEMS (Figure 7). It is also worth mentioning that the video pitch will be the first line of defence for the students to either be selected or rejected to the next level of SEMS competition. Therefore, video pitch is the first to be evaluated and assessed for its eligibility to go to the next level.

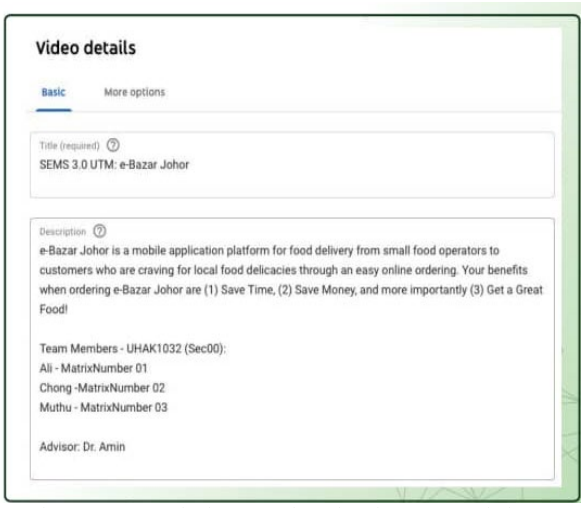

Figure 6. Description required in Video Submission.

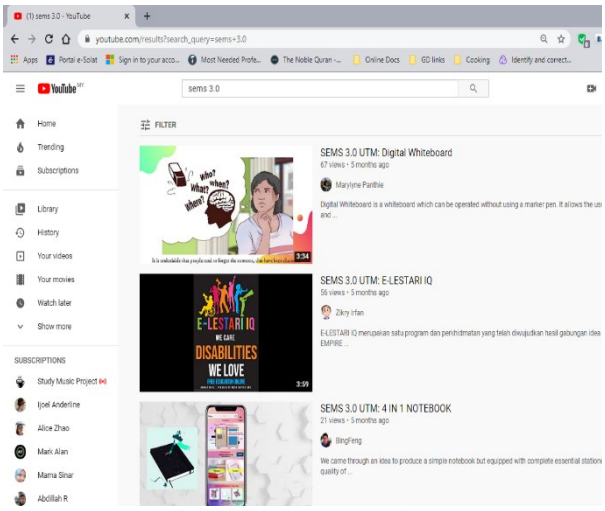

Figure 7. Use of keyword "SEMS 3.0" in YouTube

The integrated elements of all the above served as a comprehensive yet focused framework that were the basis of novelty and innovation of SEMS program. From (i) sensing for opportunity through UN SDG, (ii) structuring Value Proposition and Customer Segments utilizing BMC, (iii) realizing the ideas into a digital prototyping, (iv) structuring the four minutes maximum pitch and (v) publishing video pitch to YouTube.

Findings

The SEMS program has successfully engaged and empower students' particularly in the action-based entrepreneurship education. In this section, several outputs are presented such as the snapshot of prototypes and survey results from 302 participating students.

Sample Output

The output of the student's digital products is available on YouTube. Here are some interesting and highly potential projects as shown in Figure 8.

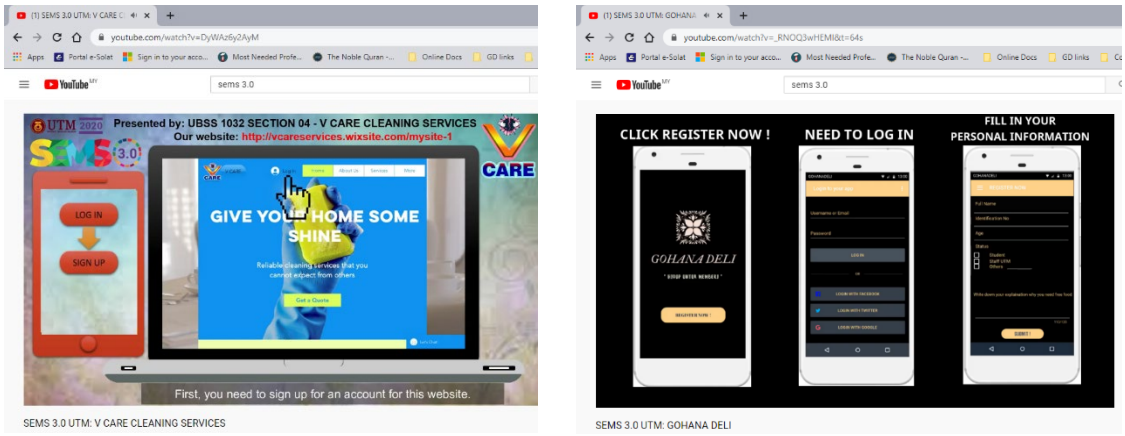

Figure 8: V Care Cleaning Services & UTM Gohana Deli YouTube Snaphot

Post Program Survey

Students are able to perform hands-on blended learning which challenges them to test their assumptions through the use of a business modelling tool. Students are also immersed in a digital tool such as mobile application tools and video recording to communicate their pitch. Additionally, an impact study has been conducted to assess the students' benefits in participating in SEMS through the entrepreneurship class. There were 302 valid responses received for this post-survey and the results are shown in Table 1. Overall, the program has increased and transformed the students' ability to be creative and enhanced their entrepreneurial orientation and intention to be an innovation-driven entrepreneur or talent.

It was found that more students are becoming good in ideation and developing tangible prototype or product, thus supporting the competency required for IR 4.0. However, the lowest agreement is on the action to start their own business after graduation.

Table 1: Impact of SEMS Program

After attending SEMS Program	Weighted Average (Means)
I feel more confident to express my idea to others.	4.10
This program transforms me into a creative person.	4.06
I am more confident to realize my idea into a tangible prototype or product.	4.03
I have a better understanding of entrepreneurship and business.	3.99
I am very familiar with the Business Model Canvas (BMC) as a business tool.	3.89
I consider to be an innovative entrepreneur (technology entrepreneur) as my career.	3.82
I will start my own business after graduation	3.75

n=302 students

Conclusion

By familiarising UN SDGs, students were able to perform better with their idea, since they are able to familiarise and sense global issues and problems thus recognizing the opportunity that are able to seize. Their idea was also successfully tested through the Business Model Canvas. However, although the BMC is employed to assist in the brainstorming, it is suspected that BMC was not treated as an iterative and dynamic document, which must endure communication and feedback with customers. Ideally, BMC must be comprehended as a live document and must undergo iterative processes with stakeholders.

Increasing students' intention to venture into their own business after graduation still remains a huge challenge not only for SEMS but for many IHLS innovation and entrepreneurship programs. It might be that students are enjoying and focusing more on the prototype development as they see the practical value for it. However, in the future, a "bridge" to enhance entrepreneurship intention must be clearly built within innovation programs to ensure that more participants will be keen on venturing their own business and become a job creator or least possible a self-employed professional.

Acknowledgement

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Internationalization at ITS During The Pandemic Through e-Programs

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Highlights: In this brief, we discuss on the implementation and evaluation of the series of activities of e-programs organized by ITS Global Engagement office at ITS Surabaya as a response to maintain internationalization and quality education amid the restriction of physical international mobility due to the pandemic. This includes short programs for students, such as Online Global Project Based Learning (GPBL), and Online Community and Technological Camp (CommTECH). Activities for staff include IconStaff (international conference for non-academic staff), and activities for lecturers include world-class university workshops. For the general public, ITS Surabaya also promotes the UN Sustainable Development Goals (SDGs) through the GLS SDG (Global Lecture Series – Sustainable Development Goals) with invited speakers from partner universities.

Key words: online short program; online guest lecture; new normal

Introduction

The current COVID-19 pandemic has caused a huge impact towards the society, including universities (Marinoni, 2020). While teaching and learning can to a large extent be shifted to online methods, the travel restrictions and campus access restrictions measures to manage the spread of COVID-19 has forced many universities to stop physical international mobility activities. In this project brief, we describe the steps taken by Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia, to maintain internationalization, or even improve internationalization efforts, under the constraints of the current pandemic situation as well as the sudden shift in learning and working from home pattern. This involves a collection of online programs, referred here as ITS e-programs, that reaches out to all the stakeholders of the university, including students, lecturers, and non-academic staff. Along these efforts, benefits typically obtainable through mobility programs such as skills enhancement, capacity building, and networking, are goals that are being targeted, despite the lack of physical shared experience in online programs. In this brief, we discuss on the implementation and evaluation of the series of activities of e-programs organized by ITS Global Engagement office. This includes short programs for students, such as Online Global Project Based Learning (GPBL), and Online Community and Technological Camp (CommTECH). Activities for staff include IconStaff (international conference for non-academic staff), and activities for lecturers include world-class university workshops. For the general public, ITS Surabaya also promotes the UN Sustainable Development Goals (SDGs) through the GLS SDG (Global Lecture Series – Sustainable Development Goals) with invited speakers from partner universities.

Innovation Objectives

Online learning programs and their platforms has existed before the pandemic. The current COVID-19 pandemic and life during the pandemic, however, is a new experience to most parts of the society. Therefore, successful adaptation method to the current pandemic should be of a common interest to most universities. The ITS e-programs for internationalization described here is the planning, as well as method of implementation and delivery of the programs to ensure engagement among the participants and to ensure the effectiveness of the programs.

The impact of these programs extends to students, lecturers, and non-academic staff at ITS Surabaya as well as partner universities. The capacity building and enhanced skills as a result of the programs should positively affect the quality of learning and quality of services at university settings. Furthermore, the networking created through these programs may have potential benefit in the future.

In summary, particularly due to the current COVID-19 pandemic that has forced the society to quickly embrace digital transformation earlier than expected, we propose online mobility programs and its corresponding implementation ideas to reach effectiveness of the online programs.

Approach and Implementation

In the implementation of ITS e-programs, we put high emphasis on the engagement of participants. With the lack of physical experiences that naturally occurs in physical international mobility, other methods to replace this had been explored. This involves virtual tours, fun ice-breaking and cultural activities, grouping strategies, among others.

The implementation of this program targets the students (both inbound and outbound), lecturers (inbound), and staff (inbound and outbound).

For inbound lecturers, we run various online guest lectures programs as follows:

1. Global Learning Program (GLP). This program integrates guest lectures into general courses for the International Undergraduate Program (IUP) at ITS, such as Physics, Mathematics, Chemistry, among others. Students are expected to gain broader insights related to their courses.

2. Guest Lecture Series (GLS). This guest lecture series covers any topics of interest and can be related to any of the UN Sustainable Development Goals. The guest lecture will be matched with existing courses and relevant departments at ITS related to the guest lecture topic.

3. Researcher and Research Student Enrichment Program (R2SEP). This is a research skills-oriented program for both ITS and non-ITS audiences, and guest lecturers are invited to deliver talks on enhancing research skills.

For inbound students as well as outbound, we run the following events:

1. e-Exchange. Students from partner universities can be registered at ITS as exchange students, and enrol into courses at ITS conducted online through MOOC for one semester.

2. e-Internship. Students from partner universities can be registered at ITS Surabaya as an internship student, and conduct an online internship program at participating laboratories in ITS.

3. e-Short program. One of our highlighted short program, CommTECH (Community and Technological Camp), has been consistently run with great success. During the pandemic, we continue to run CommTECH and other short programs in an online manner. We have planned to employ innovative techniques to try maintaining the student experience factor of these short programs. This program is available any time and not attached to the semester period.

To develop skills of non-academic staff and encourage international exposure, an international conference and workshop event called IconStaff 2020 was held, with speakers and participants primarily from non-academic staff.

All these programs are conducted through the Zoom meeting platform. The design stage and event organizing of the program are conducted by the ITS Global Engagement office with the help of student volunteers, and also involves participation from academics and staff.

Outcome and Evaluation

In total up to the writing of this brief, there has been at least 6 virtual short programs that had been held this year with participation from various partner university students as well as our own university students. The GLS guest lecture program on UN SDG topics is also another popular event with participation from various countries.

Due to the huge interest as well as the new experience as well as feedback both positive and negative obtained from these programs, ITS Surabaya plans to continue the e-programs for 2021 and beyond.

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Cornerstone: A New Approach of Learning for Management of Technology Students

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Highlights: Cornerstone project highlight a new insight of education where the students can learn and experience real job or career project and utilise their knowledge and technical skills in finishing the project. This Cornerstone project is one of the NALI approaches involve 3 subjects namely, SHAD3083/SBSD 3083 (Manufacturing Process), SHAF3083/SBSD3113 (Supply Chain Management) and SHAD 3013 (Commercial Law). This project encourages students to think creatively and promote working together in a team to solve the problems. Students has been given task to build a prototype of a new product (Manufacturing Process), seek for different suppliers which can supply all components part of prototype (Supply Chain Management) and preparing a draft of contract for suppliers (Commercial Law). The examiners for this project not just the subjects' lecturers but also 3 representatives from industrial expert in order to know their perspective about contribution of Cornerstone project to the real career life.

Key words: Cornerstone project; NALI; industrial perspective

Introduction (Project or Innovation)

Industrial Revolution 4.0 gives a new transformational design to our learning and teaching approaches. Experts and scholars in education recognize the impact of development of ICT and innovation in technology has bring field of education to the new era. They strongly agree that 4.0 Education must be in line with a new method of 21st century of teaching and learning which suit to the needs of new generation of learners and also preparing them for future ready curriculum. One of the criteria of 21st century of teaching and learning is applying and embed Cornerstone project. Cornerstone project highlight a new insight of education where the students can learn and experience real job or career project and utilise their knowledge and technical skills in finishing the project. This Cornerstone project is one of the NALI approaches involve 3 subjects namely, SHAD3083/SBSD 3083 (Manufacturing Process), SHAF3083/SBSD3113 (Supply Chain Management) and SHAD 3013 (Commercial Law). This project encourages students to think creatively and promote working together in a team to solve the problems. Students has been given task to build a prototype of a new product (Manufacturing Process), seek for different suppliers which can supply all components part of prototype (Supply Chain Management) and preparing a draft of contract for suppliers (Commercial Law). The examiners for this project not just the subjects' lecturers but also 3 representatives from industrial expert in order to know their perspective about contribution of Cornerstone project to the real career life.

Content (Project or Innovation)

1. Project or innovation objectives

- To integrate knowledge from several subjects and apply the knowledge in solving a big project are relatively considered challenging among students.
- To introduce scenario-based learning among students through real job problems.
- To enhance students' learning via team-working and makes teaching and learning more fun.
- To train students in organizing and acquiring information.

2. NALI approach implemented in the research (e.g. novelty, creativity, innovativeness, applicability and impact)

Novelty

This is a new technique of teaching and learning which is in line with IR 4.0 Education and NALI. The first Cornerstone project for Bachelor of Management Technology students in Azman Hashim International Business School. Involve 3 subjects for a start and integrate the knowledge from several subjects to solve a job scenario. Therefore, it can improve students' knowledge and understanding to the field of study.

Creativity

This Cornerstone project aims to expose the students to be creative in designing a prototype of a consumer product, search for suitable suppliers that can supply components or part of the said prototype and drafting a legal contract for supplier. It is clear that to solve a Cornerstone project student must think creatively how to integrate and fuse their knowledge on 3 subjects and transform it as an idea to accomplish a big project. This project fulfills the needs of holistic approach of learning as well as balance culminating functional abilities.

Innovativeness

Cornerstone is an active learning strategy is an innovative technique to facilitate student learning. Students can illustrate a vision, exhibit their contextual knowledge and creativity, collaborate in a team and make associations of their understanding of several knowledge during this activity.

Applicability

Provides real life scenario of job problem when the task involves to design a prototype, search for relevant suppliers and draft a binding legal contract. Furthermore, it simulates students with workplace skills and teach students how to solve complex, open ended problem using critical thinking.

Impact

Promotes change in education practice by applying theoretical knowledge through scenario based learning problem in the task given

- Teach students how to solve complex, open ended problem using critical thinking.
- Simulate students with workplace skills
- Improves their soft skills.
- Improved students' result and understanding
- Train students in acquiring and organizing information

3. Research Methodology

In order to investigate the effectiveness of this teaching approach, questionnaires were distributed via Google form to students enrolled for these three course. 42 students from 3rd year Bachelor of Management Technology responded the survey. The 5-point Likert scale was used in the questionnaire. The survey has been employed to acquire the students' perspective on the application of these games in their course. The study shows that majority of the students agreed that this Cornerstone project increase their interest and understanding of these subjects, i.e. SHAD3083/SBSD 3083 (Manufacturing Process), SHAF3083/SBSD3113 (Supply Chain Management) and SHAD 3013 (Commercial Law) and this project is a valuable tool in curriculum and should be part of the curriculum in the future.

These courses typically being taught with lecture, case studies, and problem based learning. However, a scenario-based approach was introduced in this class starting in semester 1 2019/2020 for Management of Technology students in Azman Hashim International Business School, UTM. The objective of this study was to investigate the students' perspective on the implementation of this approach in their course. The feedback from this study will help the researcher in improving the approach in classroom.

4. Finding and discussion of the project or innovation

The result shows that 98% students agree through a Cornerstone project they can understand more about these courses. They also 100% agree that this Cornerstone project can be part of curriculum in the future. Furthermore, 97% belief that this learning approach improve their marks and their soft skills.

Feedback from student's perspectives

This cornerstone project really helps to give us the image on how actual manufacturing, supply chain, commercial law is, like the machines used and the process to produce the part for manufacturing process, how to deal with the supplier, comparing the price for supply chain management and how to generate a contract with our supplier for commercial law.
Cornerstone project improve my understanding about the content of the contract and change my perspective that learning law is not too difficult
This project contributed me to had a better understanding for the courses by practising what I learnt in the class.
This project helps me how to work well in a group.
This project would be helping us determine decision to make in real situations
This Cornerstone project make us more communicate with friends and organize the flow in solving problem to sure it would be success. It a good simulation project and a have visual what is happening in career sector in future
This project provides me practices and extra knowledge. It also gives me opportunity to feels the experience of working in the environment of real organizations
This project enhances my leadership skills Learning contract via cornerstone makes me really understand about terms, clauses, warranties and conditions in a contract As a 3rd year undergraduate student, I personally think that the cornerstone project gives students the opportunities to deeply understanding the subject included, which are Manufacturing Process, Supply Chain Management, and Commercial Law through a real- life application
This project can be a guide line to understand more about our courses
I love the Cornerstone project because instead of understanding the theory of several topics, I have an experience to do it in the real even though it is just a project simulation.

There are many lessons learned from implementing the Cornerstone project in this course. It promotes change and educational practice, especially through student experience and feedback. Traditional examination assessment only focuses on 'what a student knows' instead of 'how they can apply and integrate their knowledge in solving real job scenario.' This Cornerstone project technique illuminates the implicit process of students' thinking and reflection on the knowledge that they learned in class into conducting the given tasks as Maguire (2006) argues that it is time to 'make visible the conditions of knowledge production, than we create more alienating knowledge'. The authors suggest honouring student voices by embracing the process of learning.

The learning process gives the opportunity for students to apply their theoretical knowledge into practice and enhance the learning process in completing the required tasks. This study lends support to the argument by Aadland & Aaboen (2020), who strongly promote the learning process in entrepreneurship education to focus on real-world experience, action, and reflective processes to engage students in authentic learning. The authors belief that this strategy would lead to greater entrepreneurial abilities and propensity, which eventually enhance the entrepreneurial performance, which benefits individuals and societies.

CONCLUSION

In conclusion, these Cornerstone project is a very innovative and effective pedagogical technique in teaching and learning especially for Management of Technology (MoT) students. Initially, the techniques clearly demonstrated the increase in students' interest in the subject, improve their team working and communication skills, and their engagement in class. Students strongly recommend that these techniques are embedded into the curriculum of MoT programme.

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Role-Play as a Teaching Strategy of Positive Psychology for Undergraduate Psychology Program

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Highlights: The role of role-play as a scenario-based learning approach in the teaching of positive psychology among the fourth year Undergraduate Psychology students in Universiti Teknologi Malaysia. While role-play is not a new technique in teaching such skills, its use is generally reserved for the training of higher-level students. In this project, students are required to develop Positive Psychology Intervention (PPI) based on the specific target of clients. The PPI was developed based on the Antecedent-Behavior-Consequence (ABC) Model, which is a tool that can help people examine behaviors they want to change, the triggers behind those behaviors, and the impact of those behaviors on negative or maladaptive patterns. Then, students work in a group to perform a role play training in order to practice how to conduct the intervention in the real situation context. Through a process of constructivist learning, students arrive at meaning between each other in how they approach even improvised role scripts.

Key words: Role-play, Positive Psychology, Scenario-based Learning

Introduction (Project or Innovation)

Role-play within the framework of scenario-based learning is learning through performing the role based on scenario given. Role-play can be used to teach skills; to solve a problem through the dramatic elements of scenario-based learning; to explore issues, or for speculative reasons (Errington, 1997). As mention by Errington (1997), the stimulated scenario provides the context for the role-play. There are three element of role-play: role taking, role making and role negotiation. The first element is the students must have some basic understanding of the social expectations of their role in order to get into the role as psychologist. In Students need to know about the role of Positive psychologist to encourage acceptance of one's past, excitement and optimism about one's future experiences, and a sense of contentment and well-being in the present. In this class, students are required to design intervention module to help their clients. For example, the module that can enhance the level of resilience among their clients during Pandemic Covid-19. Secondly, as part of the role-play, the student need to create new roles, switching between roles and modifying roles. The students are required to conduct training based on their role. So, they need create their role in the training. Lastly is related to role negotiation that depending on how other members within the interaction view the role. This can be the real-world or the professional work context into the classroom. Students involved in role-play can explore their shared understanding of learnt material. In this training for positive psychology students benefit from being able to perform the role of psychologist and receive feedback on their performance.

Content (Project or Innovation)

This role-play was used in the subject SHAY4043 Positive Psychology. Problem-based role-play was used as this approach is effectively to explore the best intervention for clients with a particular problem such as lack of resilience. This approach involves students being creative in their application of knowledge related to psychology to develop the intervention. Such a planned learning activity encourages the attribute of student teamwork in decision making and replicating authentic work roles. The students work as a team and they were performed as psychologists. They delivered the training based on the module to help their client. Furthermore, as a requirement of the scenario-based learning team project, individual members through a negotiated process of peer review arranged for the content of their scenarios and the learning objectives to be reviewed by other members of the team.

Effective use of role-play for educational purposes involves reflection and evaluation of the role play on the part of both instructors and students (Errington, 1997). Thus, in this course, the students were given the opportunity to report on the learning experience, what they liked and did not like. The lecturer then give feedback on what worked and what did not work.

Students have been very encouraging of the scenario-based learning role play teaching strategy. Not only are they motivated to attend classes but their feedback reflects their interest in being involved in the teaching process. This

role-play activity make students participate actively in the learning experience. The students are able to get into the role, explore issues, discuss their shared understandings and reflect on the process of learning.

At the end of the Scenario-Based Learning Role Play session, the students are expected to:
1. Integrate the concept of positive psychology to identify potential and opportunity for self - improvement
2. Stimulate creative idea in problem solving activities
3. Organising a training or service learning professionally

This role-play activity has a possibility to be commercialized based on its outcome. The Positive Psychology Intervention program can be used as by teaching instructor or trainers. Table 1 displays the instruction of the development of the PPI to guide students.

Table 1: Instruction of the Students to Develop Positive Psychology Intervention

A. Developing Positive Psychology Intervention: MODEL ABC A = ANTECEDENTS B = BEHAVIOUR C = CONSEQUENCE
B. Content of the Modul: Instruction Activity (e.g. talk, Role Play, games) Schedule of training Material Role of Trainer Role of Clients

From a pedagogical perspective, there were three specific teaching approaches that were incorporated in the learning design plans is presented in Table 2.

(a) Catering for Learner Needs

In the beginning of the sessions, it needs to be emphasized the role of positive psychology to promote well-being and positive cognition and emotion. This includes reminding students about the ABC Model as the framework to develop Positive Psychology Intervention. This model can also be found in other subjects and classes previously. This increases their awareness of the wider context for this learning topic. Throughout these explanations, some references to their previous classes and sessions will also help provide a continuum of learning.

(b) Active Learning Approaches

The first session involves learning by doing where each student discuss in their group about the goal of their PPI. The students discuss how they apply the ABC Model to identify the issue that they need to resolve based on their PPI. In the second session, the students perform a role play to deliver their PPI toward the clients. The next step is to go around the class, and let the students identify and explain possible areas that need to be improved, with peer feedback.

(c) Feedback to Learners

In addition to the teacher's feedback to learners, it is also important to explore ways that they can give feedback to one another. In the second session, there is to be some discussion with peer feedback, between the role players and the observers (during and after the role play activity). The teacher also collects the PPI submitted by each group for the purposes of feedback. During the sessions, the teacher regularly invites and questions the students in order to understand their level of learning. Each of the sessions has formative assessment activities that help them review and measure their knowledge of positive psychology.

Impact of this Project

The Problem-based Role Play can help students enhance their knowledge and skills as a psychologist. The example of student's feedback as below:

> *"The opportunity to work through Role-Play in PPI enabled me to match theory to practice in a way that has given me unique insight as to what my role would be once I become a psychologist "*

Majority of students are obtained good grade in their assessment. Around 60% of the students obtained A and A- of this subject. The academic performance of the students are as below:

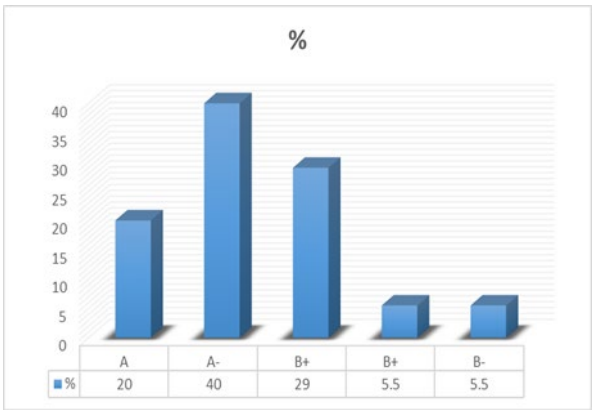

Figure 1: Academic Performance of Students on Positive Psychology

Table 2: Lesson Plan for the Positive Psychology Intervention Program

Learning Activity *What will the learner 'do'?* The learner's "journey". Describe what the learners are required to do, how they will make sense of the learning.	**Learning Support** *What will the teacher do?* The support strategies a teacher will organise to assist students in their learning, e.g. guide, support, instruct, manage groups, feedback
Students work in group of five to develop Positive Psychology Intervention (PPI) ↓ Role-play of the PPI that they developed. Each student must have role. ↓ Active discussion on a related perspective, involving everyone ↓ Closure – Questions & interaction with the lecturer	Welcome and introduction: importance and relevance of the PPI Give instructions for the role play activity Ask students to give peer feedback Explain and initiate the 'Round' learning activity Conclusion: Summarize and question the students, and also invite feedback

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Serambi Ilmu Minecraft

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Highlights: Minecraft education is an open game education that elevates the elements of 21st century learning,namely creativity , collaboration and indepthproblem solving techniques. This minecraft education has no limits other self imagination. Through minecraft, students can create assignments with classmates in a protected environment. In addition, Minecraft educationis also a platformthat offers the best way to transform knowledge between educatorsand students as well as attract students to learn topics that are interwined.

Key words: Minecraft; 21st century; new norm; gamification

Introduction (Project or Innovation)

Minecraft education is an open game education that elevates the elements of 21st century learning,namely creativity , collaboration and indepthproblem solving techniques. This minecraft education has no limits other self imagination. Through minecraft, students can create assignments with classmates in a protected environment. In addition, Minecraft educationis also a platformthat offers the best way to transform knowledge between educatorsand students as well as attract students to learn topics that are interwined.

Minecraft education is a classroom friendly program because it is able to control the classroom, be able to collaborate on various subjects and able to connect with the world's leading network of mentors to get support and guidance.

Next, this Minecraft education works in line with 21st century education. This is because Minecraft education is able to offer graphics based education. In this era of globalizationeducation has booked towards "coding" education. Channels such as "CODE.org, TYNKER, SCRATCH and Microsoft Make Code helps a lot in this coding education. Students can use blocks as code to build material in this Minecraft.

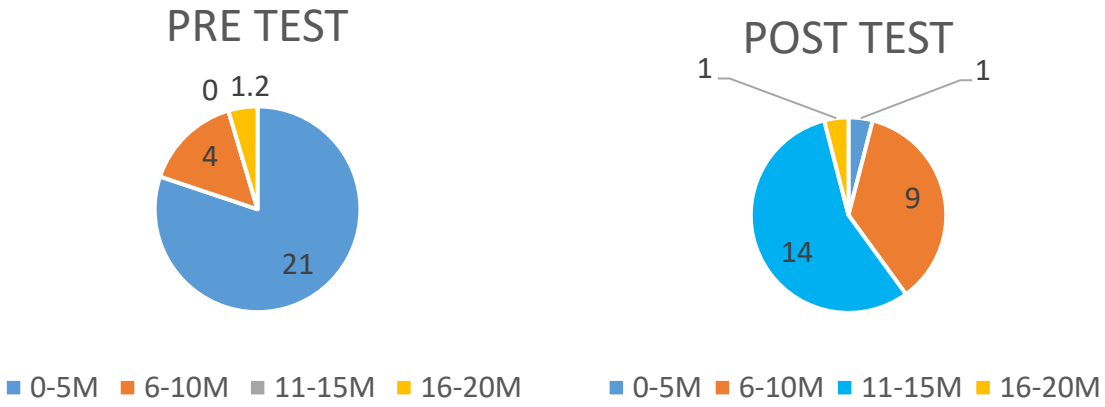
Furthermore this can connect students around the world and students can exchange opinions in terms of the tasks they perform. Therefore, I choose this program in order to help the learning process and teaching more interesting. This innovative project is carried out to assist the teaching and learning of English in class. This iinovation could attract students of English through games and to provide knowledge while playing Minecraft that is of interest to today's students. This innovation requires a very minimal level of internet.

Content (Project or Innovation)

This extended abstract should address the following;

- Project or innovation objectives
  - This innovation projects can foster and increase the level of cooperation among students. This is because students can use the same room in this minecraft to build their respective projects.
  - This innovation project can attract students to learn grammar in an entertaining manner.
  - Able to dig out talents to produce student's creativity and innovation.
  - Can boost kids with learning dissabilities and can solve boring teaching.
  - Can open opportunities for rehabilitation students to gain a level of mastery in better classroom assessment.
  - Can create cooperation between students and can create good classroom control.
- NALI approach implemented in the research (e.g. novelty, creativity, innovativeness, applicability and impact)
  - This Minecraft learning involves learning new norms. When we have been through the lockdown due to pandemic covid, we have been exposed to virtual learning and teaching. By applying Minecraft, teaching and learning will be more fun, more casual and meaningful.
  - Students will learn the malay language using Minecraft applications where it will be a very fun activity. More creative in using combination of exercisesmade using gamification.
  - This new norm application is an innovative idea where the Malay language is taught using the system by using the edutainment.

- This Minecraft application is very easy to use because this application is available in the KPM Delima System and can be uploaded easily. Moreover this system only requires minimal wifi.
- Then pupils showed an increase in marks in the tests conducted on them. Students can recognize this Minecraft system, at the same time. Students can also get to know new technologies during lessons.



- Research Methodology

  The teacher chooses a grammatical title. Teacher logs in to the "Coloring Squared" page and selects the material you want to combine. The teacher changes and edits the exercises in the downloaded sheet.

  The sheets can be modified in various forms based on what you want to test.

  The sheet can be modified according to the target group and can be simplified.

  Sheets can be modified where the number box can be replaced with adjectives, then the task will be easier and easier to learn.

  Pupils are given core exposure to adjectives. Pupils fill in the answers in the given sheet. Pupils color the sheets based on the color code given. Pupils are given exposure to simple Minecraft software. Pupils fill in the blocks and build pictures that have been colored in Minecraft software. Pupils complete blocks based on pictures.

  This lesson can be done without meeting one to one whereby kids can colour the worksheet through online before build their shape or city.

- Finding and discussion of the project or innovation

  This innovation is very unique, not difficult to implement, low cost and can be applied in other subjects.

  This innovation is able to produce students who are active, confident, produce students who have the ability to communicate with friends and teachers.

  This innovation is suitable for use by teachers in year 1 to 6 because it involves aspects of virtual games.

  In addition teacher can customize the sheet with other grammatical topics such as pronouns, nouns, conjuction and so on.

- Other relevant information (e.g. commercialization potential, awards received (title of project, exhibition and year))

- This system can be applied in other subjects such as Mathematics, English, Tamil, Chinese and other elective subjects. Teaching sessions can be transformed into more fun and effective. in 21st century teaching students should be applied with such an application to give exposure out of the box to students.

Award received : Silver medal (individual category)

Title of project: Serambi Ilmu Minecraft (SIMC)

Exhibition : Pertandingan Guru Inovatif, Pejabat Pendidikan Daerah Johor Bahru 2020

Acknowledgement (if any)
I am very grateful to the Ministry of Education for applying 21st century teaching to students in Malaysia. I am very grateful to teacher Aliff who passed this knowledge to me in a closed seminar at Shell Tower on 29.02.2020. I would like to thank Microsoft Malaysia for the course given. And I would like to thank my head of department for encouraging me to use this application in school.

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https://www.coloringsquared.com/

https://education.minecraft.net/

The Implementation of Mind Map Technique in Learning Commercial Law

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Highlights: This paper describes the application of mind map technique as approach in teaching and learning Commercial Law subject. This course typically being taught in lecture format, discussion, problem based learning and case studies. However, mind map was introduced in this class in order to solve problems in learning legal topics. Law courses been known among students as dry subjects. Students feel it is very hard to understand legal jargon, memorize sections and cases, extract out issues from legal problems, application of legal terminology, lots of facts and theories and giving decision for case studies. Thus mind map was introduce due to lack of interest and motivation amongst students and ineffective teaching method in the classroom. Survey has been employed to acquire the students' perspective on the application of mind map techniques in their course. The study shows that majority of the students agreed that mind map technique is able to increase their interest and level of understanding of the subject, and this approach as a valuable tool in curriculum. The students suggest that this technique should be part of this subject in the future.

Key words: Mind map technique; Commercial Law; Students' perspectives

Introduction (Project or Innovation)

This paper discusses the mind map technique for Commercial Law course in Azman Hashim International Business School, Universiti Teknologi Malaysia. The course typically being taught with lecture, case studies, discussion and problem based learning. However, mind map approach was introduced in this class starting in semester 1 2019/2020 for Management of Technology students in the Azman Hashim International Business School, UTM. The objective of this study was to investigate the students' perspective on the implementation of this approach in their course. The feedback from this study will help the researcher in improving the approach in classroom.

Content (Project or Innovation)

This extended abstract should address the following;

Project or innovation objectives

1. To introduce mind map technique among students in solving lack of interest and motivation in learning law subject.
2. To enhance students' understanding and learning as they can apply and adapt their knowledge in the creation of mind map.
3. To emphasize cooperative learning and active learning techniques among students.

NALI approach implemented in the research (e.g. novelty, creativity, innovativeness, applicability and impact)

Although a lot of efforts have been put for successful implementation of different techniques in teaching law courses, the perspective of students to the said subject are mostly the same. Law subject been label as a bored, dull, dry subjects, hard to understand, difficult to score the courses which all end up make a barrier between students and teachers. Thus, the changes are needed in the educational process, where there is a demand to use powerful, creative and adaptable techniques in teaching and learning legal subjects. Mind mapping can be used to develop students' interest and motivation in learning law courses. Mind mapping has many potential applications to education, and can be adapted to many situations. It can be used as a teaching resource, as an aid to preparing and reviewing lectures, and the technique allows notes to be written and reviewed quickly, and most importantly enables information to be easily updated. Mind mapping can be used in many situations including problem-based learning, small-group teaching, in a one-to-one context, as an examination tool and for personal revision (Tanriseven, 2014).

Anna and Andrey (2015) emphasized that mind maps help students solve problems, brainstorm creative ideas, remember new vocabulary, take notes, enhance their reading skills, organize the tasks and prepare presentations. The authors conclude that mind mapping technique invented in the XX century is considered to be up-to-date, creative, useful and available tool for students, educators and researchers.

Research Methodology

In order to investigate the effectiveness of these teaching approaches, questionnaires were distributed via Google form to students enrolled in Commercial Law course. 20 students from section 1 and 32 students from section 2 responded the survey. The 5-point Likert scale was used in the questionnaire.

Finding and discussion of the project or innovation

The mind map technique provides better integration of several concepts in the Commercial Law course simultaneously. Among the feedback from students that participated in this simulation games were relatively positive. Among the anecdotes given by students include: " I think Commercial law subject is an interesting subject to learnt"; " Mind map technique change my perspective about commercial law subject and I love this subject because of this approach of teaching", "Mind map technique is immediate and useful platform for students to apply their knowledge in legal subject", " I am able to memorize cases and sections easily via mind map", "The mind map technique is a way to help me to understand better the main points of every chapter in law of contract", "I enjoy doing mind map because it helps me to make notes, something which is more practicable and learning with less stress", "Creates mind map improves my understanding about the legal concept".

There are many lessons learned from implementing the mind map in this course. It just not promotes changes in educational practice, however tremendous result in fact can be seen from feedbacks, good evaluation by students for the course as well as good grades they obtain at the end of semester. Traditional examination assessment only focuses on 'what a student knows' instead of 'how the student gain something new.' The mind map technique is considered as classroom exercises, illuminates the implicit process of students' thinking and reflection on the knowledge that they learned in class into conducting the given tasks. Mind maps are multi-sensory tools that may help students organize, integrate, and retain information (D'Antoni *et. al*, 2010). The authors suggest that using mind mapping as a note-taking strategy facilitates critical thinking.

This technique emphasizes on understanding concept, organize information, integrate facts and theories and manage note taking. The learning process gives the opportunity for students to apply their knowledge into practice through completing the required tasks. This learning strategy may differ in efficacy and applicability, they are all based on a conceptual framework called the constructivist theory of learning, which states that meaningful learning, or learning with understanding, occurs when learners assimilate new information within their existing frameworks. This study lends support to the argument by *Wikramasinghe et.al* (2011), who strongly promote the learning process by stating that mind maps can be used as a teaching tool to promote critical thinking in education by encouraging students to integrate information between disciplines and ability to construct mind maps makes both learning and teaching more enjoyable.

Conclusion

In conclusion, mind map technique is innovative and effective pedagogical technique in teaching Commercial Law subject. Initially, the technique clearly demonstrated the increase in students' interest in the subject, improve their team working and communication skills, their engagement in class and effective teaching method in the classroom. Students strongly recommend that this technique can be embedded into the teaching of Commercial Law subject.

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Perlaksanaan Amali Asas Sistem Maklumat Geografi menggunakan Pembelajaran Berasaskan Masalah

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Sorotan: Pembelajaran berasaskan masalah (PBL) ialah salah satu kaedah pembelajaran aktif dalam pengajaran dan pembelajaran abad ke-21. Ia lebih tertumpu kepada proses pembelajaran berasaskan pengalaman seseorang pelajar berbanding pendekatan tradisional yang mana telah dikatakan seperti terhad, pasif dan bercorakkan *spoon-feed*. PBL ialah satu kaedah pembelajaran berasaskan masalah sebenar daripada industri yang dapat merangsang proses pembelajaran untuk mencapai hasil pembelajaran (CLO) kursus. Justeru, projek ini memperkenalkan reka bentuk modul amali berasaskan PBL yang telah dijalankan bagi mengajar salah satu mata pelajaran teras bagi program Geoinformatik di Universiti Teknologi Malaysia, iaitu kursus Prinsip Sains Maklumat Geografi. Tugasan berasaskan PBL telah direka bentuk bagi memperkenalkan proses asas pembangunan GIS berdasarkan subsistem GIS khusus untuk pelajar baru yang pada kebiasaannya masih kurang pendedahan dengan bidang yang baru diceburi ini.

Kata Kunci: Sistem Maklumat Geografi; Pembelajaran Berasaskan Masalah; Pembelajaran Aktif;

Pengenalan Projek

Projek ini bertujuan untuk mempraktiskan pendekatan PBL iaitu suatu pembelajaran autentik melalui tugasan yang menggunakan konteks dan permasalahan sebenar daripada industri, seterusnya menjadi stimulus untuk pelajar belajar mencari penyelesaian menggunakan perisian GIS. Selain itu, projek ini bertujuan untuk mencapai *course learning outcome* (CLO) bagi kursus Prinsip Sains Maklumat Geografi (GIS) yang ditawarkan dalam program Sarjana Muda Sains Geoinformatik, Fakulti Alam Bina dan Ukur, Universiti Teknologi Malaysia untuk pelajar baharu yang baru mendaftar program ini pada semester satu. Berdasarkan pemerhatian, tugasan berasaskan PBL berkesan untuk memperkenalkan guna pakai GIS dalam konteks tertentu melalui amali asas pembangunan GIS khusus untuk pelajar-pelajar baru. PBL membantu pelajar untuk menjalani proses pembelajaran aktif, bekerja dalam kumpulan disamping membuat eksplorasi bersama mencari penyelesaian untuk mencapai output yang dijangkakan. Pembelajaran aktif yang melibatkan industri ini juga dapat memberi pendedahan awal pelajar baharu berhubung prospek kerjaya dalam bidang ini.

Projek Objektif, Inovasi dan Kreativiti

Kebanyakan pelajar yang baharu mengikut Program Sarjana Muda Sains Geoinformatik masih tidak jelas apakah bidang yang akan dan dipelajari selama 4 tahun pengajian dan kerjaya bagaimanakah yang akan dipelopori apabila graduan kelak. Jadi pengajaran asas kepada bidang GIS terutamanya kepada pelajar tahun 1 yang baharu sahaja mendaftar pengajian adalah mencabar dan penting untuk menarik minat pelajar dalam bidang yang mungkin asing bagi mereka. Ini selari dengan pendapat mengatakan pelajar siswazah bidang GIS menghadapi kesukaran untuk mengaitkan teori GIS kepada praktis di dunia sebenar (Peacock, 2018).

Jadi, amat penting untuk tenaga pengajar memikirkan kaedah yang kreatif untuk menarik minat pelajar baharu melalui pembelajaran aktif yang dalam masa yang sama dapat memperkenalkan prospek kerjaya bidang yang bakal dipelopori diawal semester. Projek ini juga merupakan perintis modul PBL untuk mengajar topik pengenalan kepada GIS melalui amali asas yang mudah khusus untuk pelajar baharu yang mendaftar program Geoinformatik, khususnya di Malaysia. Projek ini juga merupakan satu inovasi kepada kaedah pengajaran modul sedia ada yang hanya memberikan tugasan amali secara langsung kepada pelajar, tanpa memerlukan pelajar untuk memahami konteks permasalahan industri yang perlu diselesaikan terlebih dahulu.

Oleh yang demikian, projek ini menyediakan satu model Pembelajaran Berasaskan Masalah Berpandu (*Guided Problem Based Learning*) bagi pengajaran kursus asas Prinsip GIS kepada pelajar baharu (pelajar Tahun 1). Modul PBL ini adalah bertujuan

(i) Menyediakan rekabentuk modul amali asas pengenalan kepada sistem maklumat geografi (GIS) kepada pelajar baharu menggunakan pendekatan Pembelajaran Berasaskan Masalah (PBL)

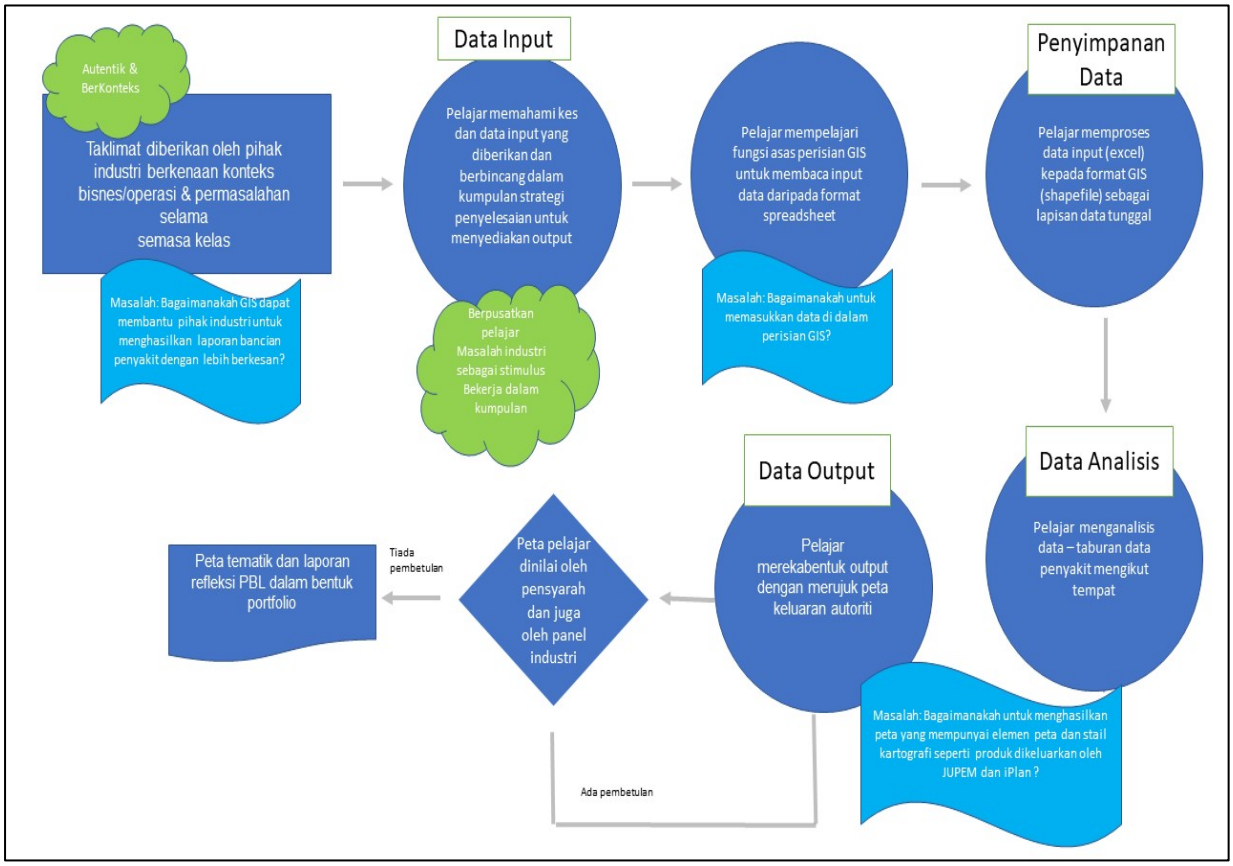
(ii) Memberi pendedahan kepada pelajar berkaitan aplikasi GIS melalui penglibatan dan permasalahan autentik daripada industri

Metodologi

Kaedah PBL telah dilaksanakan dalam kursus ini bagi pengajaran topik berkaitan konsep empat subsistem GIS, iaitu (i) Data Input, (ii) Penyimpanan Data, (iii) Data Analisis dan (iv) Data Output dalam pembangunan GIS. Kerangka PBL ini adalah hampir sama seperti Solem (2001) yang menghasilkan model amali asas GIS. Namun memandangkan pada kursus ini, pelajar tahun 1 tidak diberi pendedahan kepada pangkalan data (yang akan diajar di tahun ke-2 dan ke-3), jadi model Solem (2001) telah diubah suai. Oleh itu, di dalam kerangka ini, data yang dimasukkan ke dalam perisian GIS hanya akan disimpan dalam bentuk lapisan data tunggal sahaja. Sebelum melaksanakan tugasan PBL ini, pelajar telah didedahkan dengan struktur data geospatial, konsep permodelan data di muka bumi ke dalam komputer, sistem koordinat dan juga amali berpandu fungsi-fungsi dalam perisian GIS, iaitu di dalam projek ini adalah perisian ArcGIS yang diajar sebelum projek PBL dimulakan.

Pelajar dibahagikan kepada beberapa kumpulan. Setiap kumpulan diberikan kes sebenar daripada industri, iaitu di dalam projek ini industri adalah Unit Biosekuriti Tumbuhan, Jabatan Pertanian. Permasalahan industri yang dihadapi dalam menyediakan pelaporan tahunan ke ibu pejabat berkenaan aktiviti bancian penyakit yang telah dibuat merupakan konteks PBL dalam projek ini. Praktis pelaporan menggunakan jadual Spreadsheet telah kenalpasti sebagai kunci masalah untuk diselesaikan oleh pelajar di dalam projek ini. Persoalan bagaimanakah GIS boleh menyediakan satu output yang dapat membantu pihak industri menyediakan laporan berasaskan kedudukan?

Di akhir projek, melalui tugasan amali yang diberikan, pelajar dapat memahami kelebihan dan menghargai kepentingan GIS dalam pelaporan kes penyakit tumbuhan menggunakan paparan peta visual disamping pendedahan amali asas memproses data daripada sumber sekunder sehingga menjadi data GIS ready. Rajah 1 menunjukkan carta alir kaedah amali Pembelajaran Berasaskan Masalah yang disediakan.



Rajah 1 Carta Alir Kaedah PBL – Pengenalan Kepada Sistem Maklumat Geografi

Analisa Impak Kepada Pelajar

Analisa daripada survei yang telah dibuat dapat melihat keberkesanan kaedah PBL dalam pemerkasaan (*empowering*) dan penglibatan pelajar (*engagement*). Jadual 1 memaparkan *rating* daripada pelajar (bil =24 orang) berdasarkan soalan survei yang telah diedarkan.

Jadual 1: Rating yang diberikan oleh pelajar berdasarkan soalan survei

Kriteria : Pemerkasaan (*Empowering*)	**1**	**2**	**3**	**4**	**5**
1. Daripada projek ini, saya memahami bagaimana GIS boleh digunakan dalam sektor pertanian terutamanya berkaitan penyakit tumbuhan	0	0	0	16.7	83.3
2. Projek PBL meningkatkan pemahaman saya dalam guna pakai sistem maklumat geografi	0	0	0	8.3	91.7
3. Projek PBL meningkatkan kemahiran berkomunikasi saya terutama tahap keyakinan membuat pembentangan di hadapan panel industri	0	0	0	20.8	79.2
4. Projek amali berasaskan PBL meningkatkan kemahiran saya dalam menghasilkan peta digital	0	0	0	12.5	87.5
5. Projek PBL meningkatkan kemahiran kerja dalam kumpulan, terutamanya untuk mencapai misi projek	0	0	0	12.5	87.5
Kriteria : Penglibatan (*Engagement*)					
1. Projek PBL yang melibatkan industri mempengaruhi saya untuk aktif terlibat dalam menyiapkan tugasan	0	0	0	16.7	83.3
2. Projek PBL telah menambah minat saya dalam bidang GIS	0	0	0	16.7	83.3
3. Projek PBL yang memerlukan saya menyelesaikan masalah daripada industri meningkatkan pengalaman pembelajaran saya	0	0	0	12.5	87.5

Potensi Pengkomersilan –

Rekabentuk model PBL untuk pembelajaran asas amali GIS telah dimohon hak cipta terpelihara (copyrighted) daripada myIPO melalui ICC UTM (kini berstatus pending). Rekabentuk model amali asas menggunakan PBL ini boleh menjadi rujukan kepada kursus lain di pusat pengajian tinggi, kolej dan politeknik yang mengajar subjek berkaitan pengenalan kepada GIS.

Rujukan

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Pembelajaran Interaktif Berasaskan Buku Infografik

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Sorotan: Pembelajaran abad ke 21 menunjukkan bahawa teknologi dalam pendidikan adalah penting untuk menjadikan sesuatu proses pengajaran dan pembelajaran menjadi lebih menarik. Teknologi digunakan sebagai perangsang kepada pelajar-pelajar untuk terus belajar. Kaedah kombinasi di antara grafik dan teknologi digunakan iaitu pembelajaran interaktif berasaskan buku infografik. Maklumat interaktif infografik tersebut membolehkan pelajar-pelajar meneroka sendiri maklumat yang disediakan mengikut jalan cerita dan infografik yang disediakan. Oleh itu, pelajar-pelajar berada dalam perspektif pembelajaran yang berbeza dari hanya mendapat maklumat berasaskan pembacaan dalam bentuk teks sahaja. Infografik juga merupakan salah satu elemen visual penting dalam media cetak dan media elektronik untuk memudahkan pelajar memahami sesebuah buku yang diterbitkan.

Kata Kunci: *pembelajaran* interaktif, infografik

Pengenalan

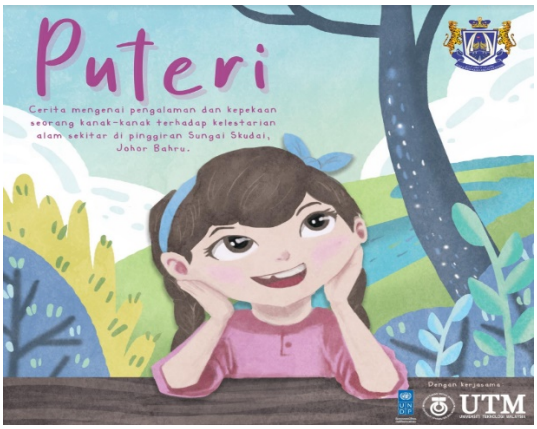
Perkataan interaktif menurut Kamus Dewan Bahasa Pustaka (1992) bermaksud interaksi atau saling bertindak. Interaktiviti membolehkan pelajar untuk meneroka dalam pelbagai cara. Melalui interaktiviti juga, pelajar akan terlibat secara aktif dalam proses pembelajaran dan seterusnya meningkatkan tahap motivasi dan minat terhadap pembelajaran. Interaktif dalam pembelajaran ialah mekanisma asas yang mesti ada untuk memperolehi pengetahuan dan pembangunan kemahiran kognitif dan fizikal (Barker,1990). Borsook dan Wheat (1991) menyatakan bahawa interaktif adalah kecepatan tindakbalas terhadap aktiviti memasukkan maklumat yang tidak mengikut turutan iaitu maklumat dimasukkan mengikut kesesuaian dan kehendak semasa, kebolehsesuaian antara manusia dengan sistem, maklum balas serta merta, pilihan pengguna dan komunikasi dua hala. Sim (1997) menerangkan bahawa interaktif asas merupakan tahap point and click untuk kiosk dan aplikasi maklumat manakala permainan dan produk pendidikan memerlukan tahap interaktif yang lebih tinggi. Merujuk kepada Rhodes dan Azbell (1985), terdapat tiga aras interaktiviti iaitu reaktif, koaktif dan proaktif. Aras reaktif hanya memberi sedikit kawalan ke atas kandungan pelajaran. Aras koaktif memberi kawalan kepada pelajar untuk mengawal urutan fasa dan gaya pembelajaran. Manakala aras proaktif membolehkan pelajar mengawal kedua-dua struktur dan kandungan aturcara. Proses pembelajaran semakin berkesan jika aras interaktiviti semakin tinggi (Rhodes dan Azbell, 1985).

Penyampaian maklumat kepada pelajar-pelajar melalui infografik merupakan kaedah yang cepat berbanding penyampaian melalui teks sepenuhnya didalam konteks pembelajaran. Menurut Newsom dan Haynes (2004), infografik merupakan visual grafik yang mewakili maklumat, data dan pengetahuan iaitu maklumat disampaikan secara cepat, jelas dan kompleks seperti jurnal, pendidikan dan pengetahuan. Kini, terdapat banyak bahan diterbitkan di pasaran. Oleh itu, bahan bacaan yang dihasilkan perlu disampaikan dalam bentuk yang lebih menarik agar dapat menarik minat pelajar untuk membaca. Jika dilihat keupayaan manusia untuk mentafsir maklumat berbentuk visual adalah lebih cepat berbanding perkataan yang ditulis. Menurut Bradford (2004), kebanyakkan manusia hanya dapat mengingati kira-kira 30 peratus melalui pembacaan. Oleh itu, bantuan visual akan dapat meningkatkan lagi tahap ingatan mereka. Maklumat infografik lebih mudah diproses kerana informasi dan permasalahan yang sebenar dan kompleks akan menjadi visual yang lebih sederhana untuk dibaca oleh pelajar.

Kaedah infografik mampu menarik minat pelajar untuk membaca dan dapat meningkatkan daya ingatan mereka. Infografik dapat menyampaikan idea konsep kepada pelajar dengan cepat dan berkesan. Ia juga merupakan satu kaedah alternatif yang menggabungkan unsur dokumen dan infografik berbanding kaedah tradisional yang hanya menggunakan unsur teks sahaja dalam menyampaikan maklumat.

Pembelajaran Interaktif melalui Buku Infografik

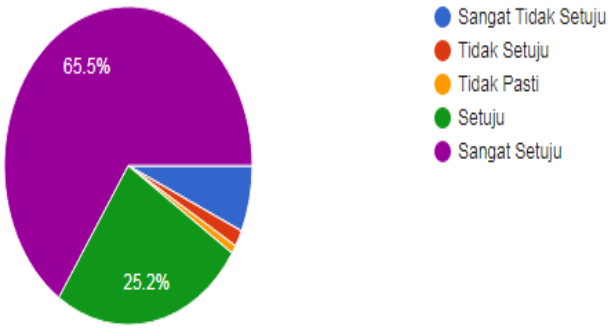
Objektif utama pembelajaran interaktif melalui buku infografik Puteri ini adalah kearah penglibatan dan pemerkasaan pembelajaran dengan menarik minat pelajar untuk membaca, memahami maklumat dan memupuk kesedaran pelajar tentang kepentingan menjaga kebersihan sungai selaras dengan inisiatif Majlis Bandaraya Iskandar Puteri iaitu kearah masyarakat rendah karbon. Penghasilan buku infografik ini dapat memperkenalkan kepada pelajar-pelajar tentang sesuatu yang baru dalam teknologi pada masa kini. Maklumat pembelajaran interaktif berasakan infografik merupakan gambaran maklumat yang membolehkan pelajar-pelajar untuk berinteraksi dengan data melalui buku infografik. Oleh itu, mereka berada dalam skop yang berbeza dari maklumat yang diperolehi daripada buku dalam bentuk teks sahaja. Ianya memerlukan proses yang teliti dalam membentuk sesebuah maklumat infografik. Projek ini menggabungkan elemen ilustrasi grafik supaya pelajar-pelajar tertarik untuk membaca dan memahami maklumat yang disediakan. Infografik atau maklumat grafik merupakan visual grafik maklumat. Infografik menyampaikan maklumat yang kompleks secara cepat dan jelas. Maklumat dalam pembelajaran interaktif berasaskan infografik ini merupakan gambaran maklumat tentang keseluruhan pengalaman seorang kanak-kanak terhadap kelestarian alam sekitar di pinggiran sungai yang membolehkan pelajar-pelajar berinteraksi dengan buku melalui aktiviti yang disediakan dalam buku secara infografik. Kaedah kombinasi di antara grafik dan teknologi digunakan iaitu pembelajaran interaktif berasaskan infografik dalam memupuk kesedaran pelajar-pelajar tentang kepentingan menjaga kebersihan sungai.



Rajah 1: Buku Infografik Puteri

Rajah 1 menunjukan sebuah buku iaitu Buku Infografik bertajuk Puteri. Buku Puteri ini diterbitkan oleh Majlis Bandaraya Iskandar Puteri dengan kerjasama Universiti Teknologi Malaysia dan Pembangunan Pertubuhan Bangsa-Bangsa Bersatu (UNDP). Buku ini diterbitkan dalam bentuk cetakan dan buku elektronik secara atas talian di laman sesawang Majlis Bandaraya Iskandar Puteri. Projek buku infografik Puteri dihasilkan memfokuskan kepada pelajar-pelajar berumur dua belas tahun ke bawah. Buku ini telah dilancarkan bersempena Program *RCE Iskandar Sustainable & Low Carbon Schools Exhibition* secara atas talian di *Facebook RCE Iskandar*. Selain itu, pelajar-pelajar juga perlu mengisi borang soal selidik yang diberikan setelah mereka membaca buku Puteri untuk mendapatkan hasil maklumbalas berkaitan buku dan kesedaran pelajar terhadap kepentingan menjaga kebersihan sungai.

Penghasilan buku infografik Puteri adalah susulan daripada Projek KRP RIVERDALE yang di anjurkan oleh Kolej Rahman Putra, Universiti Teknologi Malaysia dengan kerjasama *UTM Campus Sutainability* (UTMCS), *Centre for Environmental Sustainability and Water Security* (IPASA), Pejabat Harta Bina UTM dan Majlis Bandaraya Iskandar Puteri (MBIP). Projek KRP RIVERDALE bertujuan untuk membuka minda pelajar dan membentuk semangat kesukarelawanan tentang kepentingan dan teknik pemuliharaan kualiti air khususnya sungai. Program KRP Riverdale ini juga adalah untuk memurnikan hasrat Universiti Teknologi Malaysia sebagai langkah alternatif ke arah makmal hidup Universiti Teknologi Malaysia melibatkan kerjasama daripada pelbagai rakan strategik. Tambahan pula, program berimpak tinggi dan berterusan ini juga ingin mendidik masyarakat tentang penjagaan dan teknik pemuliharaan tahap kualiti air sungai, menyemarakkan semangat kesukarelawanan dan cinta akan sungai dan alam sekitar. Projek KRP RIVERDALE bermula dengan pembersihan sungai di sepanjang sungai sekitar Kolej Rahman Putra pada 30 September 2018 sempena Hari Sungai Sedunia dan sumbangan tenaga sukarelawan membuat mudball di bawah bimbingan Unit Ladang, Pejabat harta Bina dan UTMCS. Seterusnya, pada 2019 Projek KRP RIVERDALE memfokuskan sukarelawan untuk menghasilkan tanah bencah terapung dan bengkel penghasilan eko enzim. Pada tahun 2020 pula, Projek KRP RIVERDALE diteruskan dengan siri webinar khas sempena Hari Sungai Sedunia iaitu mahasiswa dan alam sekitar melibatkan penceramah dari UM Water Warriors dan Ranhil SAJ.



Rajah 2: Kesedaran Tentang Kepentingan Menjaga Kebersihan Sungai Setelah Membaca Buku Puteri

Rajah 2 menunjukkan peratusan kesedaran pelajar tentang kepentingan menjaga kebersihan sungai setelah membaca buku Puteri. Terdapat 119 pelajar yang menjawab soal selidik yang diedarkan. 65.5 peratus iaitu 78 orang pelajar sangat setuju tentang kepentingan menjaga kebersihan sungai setelah membaca buku Puteri, 25.2 peratus iaitu 30 orang pelajar setuju tentang kepentingan menjaga kebersihan sungai setelah membaca buku Puteri, 0.8 peratus iaitu seorang pelajar tidak pasti, 1.7 peratus iaitu 2 orang pelajar tidak setuju dan 6.7% iaitu 8 orang pelajar sangat tidak setuju. Oleh itu, hasil keputusan ini menunjukkan bahawa majority pelajar iaitu seramai 108 pelajar sedar akan kepentingan menjaga kebersihan sungai setelah membaca buku Puteri. Hanya sebilangan kecil pelajar sahaja yang memberi jawapan tidak pasti, tidak setuju dan sangat tidak setuju tentang kepentingan menjaga kebersihan sungai.

Penghargaan

Kami amat berbesar hati di atas sokongan yang diberikan oleh Kolej Rahman Putra, Fakulti Alam Bina dan Ukur, Fakulti Sains Sosial dan Kemanusiaan, Pejabat Pelestarian Kampus (UTMCS), *Centre for Environmental Sustainability and Water Security* (IPASA), Kumpulan Kajian Pentadbiran dan Pembangunan Tanah (LANDS), Green Environmental, Energy & Building Science Research Group (GEEBS), Program Pembangunan Pertubuhan Bangsa-Bangsa Bersatu (UNDP) dan Jabatan Perancangan Pembangunan (MBIP).

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Student Learning Time (SLT) Calculator

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Highlights: Student learning time (SLT) is one of the most important components of designing a course at the university level. This is to ensure the lecturer and students are spending the appropriate time on each course learning outcome in order to achieve the objectives of the course. However, SLT calculation is vague and difficult to grasp as results in the needs analysis show that the lecturers' knowledge on students learning time is moderate. Nevertheless, SLT remains an important component in designing the Course Information as it is the main guideline for the overall workload of the course. Therefore, Student Learning Time (SLT) calculator is developed to assist lecturers in determining the appropriate learning time based on the courses they are teaching.

Key words: Student Learning Time (SLT), calculator, teaching and learning, lecturer practices

Introduction

Student Learning Time (SLT) is the learning time required to achieve the learning outcome of a course (Mohamed, 2006). Lecturers need to plan the SLT of a course for effective learning to occur. In the first week of the semester, lecturers need to explain the SLT of the course to the students so that they know the time allocation required for each course. However, many lectuers have difficulty to determine the SLT of their courses due to vague instructions and formula. Therefore, this project designs an SLT calculator which is applicable for all lecturers and program coordinators to determine the appropriate SLT for each course easily while, saving time. Students can also use the calculator to verify their learning time.

Project Objectives

The project objectives are as follows:

i. To determine knowledge of lecturers in determining SLT

ii. To develop an SLT calculator

Need Analysis

To attain research objective one regarding lecture's knowledge in determining student learning time, an online survey through Google form was distributed. A total of 20 lecturers from Faculty of Social Sciences and Humanities, Faculty of Science, Faculty of Built Environment and Surveying and Faculty of Engineering responded to the online survey. The survey consist of 4 questions regarding lecturers' knowledge on students' learning time. Table 1 shows the responses from the survey.

Table 1: Lecturers' Knowledge on Students Learning Time

Question	Correct response	Incorrect Response

	f (%)	f (%)
What is the total SLT for a 2 hours credit course?	18 (90%)	2 (10%)
What is the minimum SLT for face to face learning for a 2 hours credit course?	12 (60%)	8 (40%)
If the course credit is 2, what is the total non-F2F SLT if there is no final exam and tutorial?	11 (55%)	9 (45%)
What is the maximum number of SLT for lectures for a 2 hours credit course?	12 (60%)	8 (40%)

Based on Table 1, it can be concluded that around 40% of the responses gave incorrect answer for question 2,3 and 4. While for question 1, majority of the respondents answered correctly which covers basic knowledge of SLT. This suggests that a portion of lecturers do not have comprehensive knowledge to determine the correct SLT and that their level of knowledge is moderate. The results of the survey point towards the need of developing the SLT Calculator.

Design and Development of SLT Calculator

In this initial stage, the SLT Calculator is designed and developed using Excel. There are only two important information that lecturers need to fill in which is the number of credits of the course and the assessment weightage for each Course Learning Outcome (CLO). Then, the SLT Calculator will immediately produce a suggested SLT for face-to-face and non-face-to-face learning. Lecturers can then adjust these values according to the activities in their course.

Novelty, Innovativeness and Creativity of the SLT Calculator

Table 2 shows the novelty, innovativeness and creativity of the SLT Calculator. The SLT Calculator is novel because it moves practices from using generic calculator to using specific SLT calculator. It is innovative because it saves time for lecturers where before SLT calculation using generic calculator requires multiple calculation which causes many mistakes, but the SLT Calculator requires just one comprehensive calculation. It also promotes transparency in education because students can use it to verify their own learning time. The calculator is also creative because it uses excel which is flexible and, in the future, can be converted to app form.

Table 2: Novelty, innovativeness and creativity of the SLT Calculator

Element	**Description**	**SLT Calculator**
Novelty	Change in practices	From using generic calculator to using specific SLT calculator
Innovativeness	Saves time as lecturers	Multiple calculation to one comprehensive calculation of SLT
	Transparency in education	Students accept SLT set by lecturers to students being able to verify if SLT is appropriate to the course credit
Creativity	Simple and ease of use	Using excel which is flexible and easy to use
		To be converted to app form

Applicability and Impact

Table 3 shows the applicability and impact of the SLT Calculator. The SLT Calculator is highly applicable as it can be used in all universities in Malaysia by all lecturers. It is also high in impact because it saves time and effort in preparing the Course Information while ensuring accuracy. Finally, it also allows students to verify that the workload they need to put into the course is worthy of the credit hours.

Table 3: Applicability and Impact of SLT Calculator

Component	**SLT Calculator**
Applicability	1. Can be applied as part of the teaching and learning practices of all universities across Malaysia be it private or public universities
Impact	1. Saves time and effort for lecturers in preparing Course Information. 2. Ensures accuracy in the SLT for the planned teaching and learning. 3. Allows students to determine whether the effort they put in the course is worthy of the credit hours.

Commercialization potential

The SLT Calculator can be sold for use at other public and private universities at a cost. The expertise of the developers can be sold through training other lecturers from universities all over Malaysia on how to use the SLT calculator. In the future, the SLT Calculator can be converted to App form that universities can buy as part of their university app such as in UTMSmart. Table 4 shows the recommended price and potential gain from selling the SLT Calculator and training lecturers on its use.

Table 4: Recommended selling price and training price of SLT Calculator

	Price per unit	**No of units**	**Projected Profit**
Product price	RM 3000.00	67 universities in Malaysia	RM201,000.00
Product Training	5 facilitators x RM150 per session X 3 sessions = RM2250 per university	67 universities in Malaysia	RM 150,750.00

Acknowledgement

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The Effect of EZ-Psy E-Dictionary (EPED) Apps towards Students' Efficacy in Learning Educational Psychology Course

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Highlights: EZ-Psy E-Dictionary (EPED) is a mobile application containing 160 terms of psychology. These interactive apps allow students to easily access definitions of 160 psychology terms learned in the Educational Psychology course. The arrangement of psychology terms that follow the topic and can also be achieved through glossaries is very easy for students to access. This mobile apps is expected to increase students' self-efficacy in mastering the definition of the psychology term which may also could improve students' achievement. Another advantage of this mobile application is that it is free and accessible to anyone.

Key words: EZ Psy E-Dictionary; Efficacy and Educational Psychology

Introduction

Learning applications have been widely used among educators to ensure that the teaching and learning process can be implemented interestingly and efficiently (Steel, 2012). In addition, the use of learning applications can further improve the quality of teaching and learning in line with the rapid development of technology. Many past studies have developed applications in diverse learning contexts such as applications for mathematics (Zhang, 2015), science (Castek & Beach, 2013) and even Language (Godwin-Jones, 2011; Levy, 2009).

At Universiti Teknologi Malaysia in particular, the teaching model of New Academia Learning Innovation was introduced as a teaching guide for academic staff. The model is a framework that contains various modes and learning materials based on student-centered learning (Zaini, Rose & Baharuddin, 2013). All lecturers are encouraged to apply active learning during teaching delivery. However, there are still implementations for certain subjects such as Educational Psychology which are quite difficult to maximize the use of technology and involve active learning.

The subject of Educational Psychology is one of the subjects that must be registered by undergraduate students in institutions of higher learning that offer a Bachelor of Education program. In the School of Education, Faculty of Social Sciences and Humanities, UTM, the subject of Educational Psychology is offered in year 1 of study.

One of the main reasons for students' difficulty in mastering this subject is due to too many terms or concepts that students need to learn and understand. More than a hundred psychological terms that students need to master from 14 learning topics. As shown in Table 1, only students from section 01 class recorded an average percentage of achievement of 80% while the average student achievement for sections 03 and 04 was less than 80%. Meanwhile, the average student achievement for the final examination for all three sections is less than 70%.

Table 1: Average Achievement for Educational Psychology Course for Study Session 20182019/2

Study Session (Class Section)	Average Achievement	
	Quiz	Final Exam
20182019/2 (02)	80%	68%
20182019/2 (03)	77%	65%
20182019/2 (04)	65%	57%

Quiz and exam questions test students' mastery of psychological terms and concepts across six of Bloom's cognitive levels. Specifically, 40% of all questions are low level questions (level of knowing, understanding and applying) while 60% are high level questions (analyzing, synthesizing and creating). Thus, it can be concluded that students' mastery of low-level questions is relatively moderate which causes poor mastery of high-level questions.

This moderate student mastery is also potentially due to the teaching methods of lecturers who still do not apply active learning. The rationale for this situation is due to too many psychological topics and concepts that need to be taught to students. In addition, there are few existing teaching aids that lecturers can use to make the teaching and learning process more interactive.

Based on the issues stated, it is clear that the difficulties faced by students as well as the limitations of lecturers' teaching materials contribute to the moderate level of student achievement. Therefore, this study wants to be conducted to develop an application known as EZ-Psy E-Dictionary to help improve students 'understanding of various psychological concepts and further improve students' mastery and self-efficacy in the learning process of this Educational Psychology course.

Innovation objectives:

The development of EZ-Psy E-Dictionary (EPED) Mobile Apps aims to enhance students' efficacy level in learning Educational Psychology Course

NALI approach implemented in the research

Novelty: To date, there is no available apps in the form of dictionary which using Malay language. This apps which consist of 160 psychology term will be an effective platform to enhance students' learning

Creativity: The apps which consist of the element of text, audio and visual could attract students' interest to learn the course. Besides, all the psychology terms were presented in very organized manner. Students could learn the term whether by topic or from the list of glossaries where the term were sequence alphabetically.

Innovativeness: Traditionally, the course was delivered majorly through lecture. The students were required to produce pen and pencil concept map which require a lot of their time to construct. By having this EZ-Psy E-Dictionary Apps, the students could easily access to the definition of each psychology term and will make them easier to understand the meaning for each term and speed up the process to produce the concept map. In addition, the apps was interactive in nature. The developed apps which using interesting technology element was able to create active learning process.

Applicability: Since this apps is free; therefore, it is accessible for all students. Plus, the apps is easy to be used. The psychological terms were presented by topic and also by alphabetical order in the glossaries section. Students could easily to get the meaning for the psychology term by browse it in the glossary.

Research Methodology

This study applied one sample pre and post experimental design. A total of 8 students who are taking Educational Psychology Couse involved as the participants in this study. At the pre study level, the participants were taught traditionally where all the psychology term were introduced by using power point slides. After completed three topics of learning, the participants were asked to give their response on the efficacy Scale. Then, post study phase was performed whereby the EZ-Psy E-Dictionary (EPED) was used as the learning tool. Again, after using the EPED completely for the first three topics, the students need to complete the post efficacy scale. Difference on the pre and post efficacy score will be analysed descriptively (mean and s.d) and inferentially (Wilcoxon test).

Finding and discussion of the project or innovation

Result of descriptive analysis showed that the mean value of students' efficacy is higher for post-test as compared to pre-test. The mean value for pre-test was in moderate level (mean=2.85) whereby the mean value for post-test was in high level (mean=3.68). To be specific, for all the 8 participants' mean score for post-test were higher than the mean score for pre-test. This imply that all the participant experiencing increment of efficacy level in learning educational psychology course.

Table 1: Descriptive Analysis on Pre and Post Mean Score on Efficacy

Partitipcant	Efficacy	
	before	after
Participant 1	2.33	3.56
Participant 2	3.33	3.56
Participant 3	2.56	3.94
Participant 4	2.78	3.17

Participant 5	2.67	3.39
Participant 6	2.61	3.83
Participant 7	3.56	4.00
Participant 8	3.00	4.00
Average	2.85	3.68

Meanwhile, Wilcoxon test was conducted to identify whether there is significant different on participants' self-efficacy after the implementation of EZ-Psy E-Dictionary. The test revealed a significant difference, where the post-test for self-efficacy statistically has significant difference as compared to pre-test with $Z = -2.524$, $p < .05$. As a conclusion, the different mean score on self-efficacy was really meaningful.

Test Statistics[b]

	EKPOST - EKPRE
Z	-2.524[a]
Asymp. Sig. (2-tailed)	.012

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

Commercialization potential

Educational Psychology course was offered to all the undergraduate students in institutions of higher learning that offer a Bachelor of Education program. Therefore, this mobile apps have a great potential to be used as learning tools. The EPED could be upgrade by adding assessment element and also relevant example which could enhance its usefulness and commercialization value.

Acknowledgement

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Pembelajaran Aktif Secara Dalam Talian Menggunakan Whatsapp

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Sorotan: Pelbagai usaha telah dilakukan oleh Universiti untuk membantu pelajar belajar secara dalam talian ekoran pandemik COVID-19. UTM baru sahaja memasuki minggu ke 7 sewaktu PKP dilaksanakan. Penyampaian pengajaran berubah 100% dari pembelajaran secara bersemuka dan teradun kepada sepenuhnya secara dalam talian. Terdapat 36 orang pelajar yang mendaftar dalam seksyen 44 bagi kursus Atribut Kejayaan Graduan (UHAK 1012) pada semester 2 sesi 2019/2020. Dua soal selidik dibina dan diedarkan kepada pelajar UHAK 1012 seksyen 44. Soal selidik terdiri dari soalan sebelum dan selepas pengajaran dan pembelajaran secara dalam talian. Soal selidik dibina menggunakan *google form*. Berdasarkan tinjauan menggunakan *google form* yang dibuat, hampir separuh pelajar menggunakan data dari telefon untuk mengikuti kelas secara dalam talian. Ini menyebabkan pelajar tidak dapat mengikuti sepenuhnya 2 jam kelas secara secara dalam talian jika menggunakan platform seperti Webex dan Zoom. Oleh itu, pensyarah banyak menggunakan platform alternatif iaitu Whatsapp untuk menjalankan kelas secara dalam talian. Berdasarkan respons tinjauan yang dibuat, sebahagian besar pelajar suka dengan pengajaran dan pembelajaran secara dalam talian menggunakan platform Whatsapp. Justeru, kertas kerja ini akan menunjukkan data yang diperolehi dari pelajar menerusi tinjauan yang dilakukan terhadap pembelajaran secara dalam talian menggunakan aplikasi Whatsapp. Selain itu refleksi pelajar dari padlet dan eppp pengajaran menunjukkan pelajar berpuas hati dan seronok dengan aktiviti yang dijalankan secara dalam talian menggunakan Whatsapp. Ini menunjukkan pembelajaran aktif masih boleh dilaksanakan walaupun pembelajaran berlangsung secara dalam talian.

Kata kunci: pengajaran dan pembelajaran secara dalam talian, Whatsapp, pembelajaran aktif, COVID-19

Pengenalan

Pelbagai usaha telah dilakukan oleh Universiti untuk membantu pelajar belajar secara dalam talian ekoran pandemik COVID-19. Universiti Teknologi Malaysia (UTM) baru sahaja memasuki minggu ke 7, sewaktu Perintah Kawalan Pergerakan (PKP) pertama kali dilaksanakan. Penyampaian pengajaran berubah 100% dari pembelajaran secara bersemuka dan teradun kepada sepenuhnya secara dalam talian (Jabatan Timbalan Naib Canselor (Akademik & Antarabangsa). Berdasarkan tinjauan menggunakan *google form* yang dibuat, hampir separuh pelajar menggunakan data dari telefon untuk mengikuti pengajaran dan pembelajaran secara dalam talian. Ini menyebabkan pelajar tidak dapat mengikuti sepenuhnya 2 jam kelas secara secara dalam talian jika menggunakan platform seperti Webex dan Zoom. Justeru, pensyarah lebih banyak menggunakan platform Whatsapp untuk menjalankan kelas secara dalam talian sehingga minggu ke-14. Walaupun menggunakan Whatsapp, pensyarah masih mengaplikasikan pembelajaran aktif seperti penggunaan mentimeter, padlet, dan edpuzzle, quiziz sewaktu pengajaran dan pembelajaran secara dalam talian.

Kandungan

Metodologi

Terdapat 36 orang pelajar yang mendaftar ke dalam seksyen 44 bagi kursus Atribut Kejayaan Graduan (UHAK 1012) pada semester 2 sesi 2019/2020. Soal selidik yang digunakan untuk membuat tinjauan untuk pengajaran dan pembelajaran secara dalam talian dibina menggunakan *google form*. Tujuan tinjauan dibuat adalah untuk mengetahui tahap kesediaan pelajar terhadap perlaksanaan pembelajaran dalam talian. Seterusnya, apabila selesai pengajaran secara dalam talian, sekali lagi tinjauan diedarkan kepada pelajar dalam bentuk *google form* untuk mendapatkan respon pelajar terhadap perlaksanaan pengajaran dan pembelajaran secara dalam talian yang telah diikuti pada setiap minggu. Pensyarah seterusnya membuat penambahbaikan terhadap respon yang dinyatakan oleh pelajar.

Dapatan Kajian dan Perbincangan

Berdasarkan tinjuan yang dibuat sebelum memulakan pengajaran dan pembelajaran secara dalam talian didapati, terdapat 66.7% yang memberikan respons. Jadual 1 menunjukkan dapatan yang diperolehi dari tinjauan sebelum pengajaran dan pembelajaran secara dalam talian dilaksanakan.

Jadual 1: Tinjauan sebelum pengajaran dan pembelajaran secara dalam talian dilaksanakan

No.	Soalan	Dapatan		
1	Adakah anda mempunyai capaian internet di tempat yang anda tinggal sekarang?	Ya 91.7%	Tidak 8.3%	
2	Apakah capaian internet yang anda gunakan untuk pembelajaran secara dalam talian?	Wifi (bawah 8mbps seperti Streamyx) 20.8%	Phone data (hotspot 70.8%)	Wifi (Unifi atau provider lain melebihi 100mbps) 20.8%
3	Adakah anda boleh mengakses E-Learning dari tempat yang anda tinggal sekarang?	Ya 95.8%	Tidak 4.2%	
4	Adakah anda boleh mengakses YouTube dari tempat yang anda tinggal sekarang?	Ya 87.5%	Tidak 12.5%	
5	Apakah kekangan internet yang anda hadapi di tempat tinggal anda sekarang sekiranya pembelajaran secara dalam talian di adakan sehingga ke hujung semester? (Nyatakan pandangan, masalah dan kesediaan anda)	• Coverage data utk telco saya di sini amat rendah jika ingin melakukan video online seperti zoom, webex. • Internet tidak begitu kuat • Kadangkala line tak dapat dan tidak berapa laju.. Sekiranya diberikan tugasan juga, agak susah untuk berbincang tentang tugasan..tapi untuk course yang melibatkan fully coursework ia tidak berapa memberi kesan.. So ok je.. mengenai kesediaan untuk belajar fully atas talian, jujur saya katakan saya masih berbelah bagi.. • Data internet yang terhad dan sedikit perlahan • tiada masalah • Capaian internet boleh tetapi tidak laju • Kemungkinan gangguan internet • Line internet sangat slow • akibat dlm rumah menggunakan rangkaian yang sama kadang kala taliannya lembab • Ya , coverage internet sangat lambat • Tiada masalah, saya telah membuat persediaan awal untuk menghadapi pembelajaran atas talian • kelajuan internet tidak memuaskan, ada ada masalah dan gangguan untuk live session • Tiada • Saya berada di kawasan kampung,ada kala waktu (waktu hujan) internet sangat lambat di rumah saya.Jika menjalankan kelas secara live,saya tidak dapat mendengar suara dan ia menjadi tidak jelas.Namun saya masih boleh menggunakan internet di sini. • Low coverage,kalau pakai zoom ,mungkin akan asyik hang atau terkeluar dari zoom. • Not enough data for internet • Saya berada di dalam UTM dan tidak mempunyai sebarang kekangan internet menggunakan wifi utm, tetapi data saya selalu tak ada line di sini. Saya berharap utmwifi boleh terus berfungsi, saya masih boleh online gunakan data cuma lambat kelajuan atas talian. • Poor coverage		
6	Adakah anda mempunyai masalah untuk membeli data untuk kegunaan pembelajaran secara dalam talian?	Ya 12.5%	Tidak 41.7%	Kadang-kadang 45.8%

Berdasarkan tinjuan yang dibuat selepas pengajaran dan pembelajaran secara dalam talian dijalankan, terdapat 88.9% yang memberikan respons. Jadual 2 menunjukkan dapatan yang diperolehi dari tinjauan setelah pengajaran dan pembelajaran secara dalam talian dilaksanakan.

Jadual 2: Tinjauan selepas pengajaran dan pembelajaran secara dalam talian dilaksanakan

No.	Soalan	Dapatan				
1	Platform pembelajaran secara online yang digemari	Zoom 25%	BigBlueButton 9.4%	Webex 37.5%	Telegram 18.8%	Whatsapp 71.9%
2	Adakah anda mempunyai capaian internet di tempat yang anda tinggal sekarang?	Ya 100%		Tidak 0%		
3	Adakah anda mempunyai capaian internet di tempat yang anda tinggal sekarang?	Wifi (bawah 8mbps seperti Streamyx) 21.9%		Phone data (hotspot 56.3%		Wifi (Unifi atau provider lain melebihi 100mbps) 28.1%
3	Apakah alatan yang anda gunakan untuk pembelajaran secara dalam talian UHAK 1012 pada 13 April 2020?	Komputer (Desktop) 9.4%		Komputer peribadi (laptop/notebook) 71.9%		Smartphone 65.6%
4	Rating capaian internet untuk pembelajaran secara dalam talian UHAK 1012 pada 13 April 2020?	Tiada capaian internet 3.1%	Capaian internet terhad (untuk whatsapp dan	Capaian internet sederhana 53.1%		Capaian internet yang optimum 40.6%

			telegram sahaja) 12.5%		
5	Adakah anda berpuashati dengan pelaksanaan pembelajaran secara dalam talian pada hari ini?	Ya 96.9%		Tidak 6.3%	
6	Adakah pembelajaran secara dalam talian selama hampir 2 jam ini terlalu lama bagi anda?	Ya 34.4%		Tidak 65.6%	
7	Adakah pembelajaran secara dalam talian selama hampir 2 jam ini membosankan bagi anda?	Ya 28.1%		Tidak 75%	
8	Adakah pembelajaran secara dalam talian selama hampir 2 jam ini membuang masa bagi anda?	Ya 6.3%		Tidak 96.9%	
9	Cara pelaksanaan yang manakah anda rasa lebih sesuai dengan diri anda selepas sesi pembelajaran secara dalam talian pada hari ini?	Tidak segerak (Asynchronous) seperti recorded video tutorial, tugasan di eLearning, whatsapp 78.1%		Segerak (Synchronous) seperti live session menggunakan BigBlueButton, Zoom atau Webex 37.5%	
10	Cara pelaksanaan yang manakah anda rasa lebih mudah faham selepas sesi pembelajaran secara dalam talian pada hari ini?	Tidak segerak (Asynchronous) seperti recorded video tutorial, tugasan di eLearning, whatsapp 65.6%		Segerak (Synchronous) seperti live session menggunakan BigBlueButton, Zoom atau Webex 43.8%	
11	Apakah kekangan dan masalah yang dihadapi terhadap pembelajaran secara dalam talian yang dijalankan pada hari ini?	• Tiada • Semuanya baik • Line internet tidak stabil • tiada kekurangan, kerana apabila menggunakan whatsapp saya lebih boleh fokus daripada menggunakan zoom. • TIADA • tiada • Tiada. • Internet lemah • semuanya baik • Soalan diajukan secara serentak jadi terdapat soalan yang tidak terjawab kerana chat bertindih tindih • Pertanyaan soalan tidak sistematik, kena cari balik scroll-scroll • saya menjadi kelang kabut kerana sepatutnya hanya satu group yang boleh menanyakan soalan jadi saya agak terkejut • Terganggu bersama urusan keluarga • Tiada masalah • Hari ni saya tak ada capaian internet • Tiada. • Kemungkinan sesi pembelajaran akan kurang fokus kerana perbincangan di dalam ruang "chat" • Alhamdulillah tiada • - • Capaikan internet tidak berapa kuat untuk download video • Internet tak stabil • Internet terhad • Capaian talian internet yang agak terhad tetapi buat masa ini dalam 2 jam masa yang paling lama untuk kelas online adalah baik sahaja capaian internetnya • Saya rasa pembelajaran hari ini sangat berjaya kerana tidak ada apa-apa masalah yang berlaku seperti minggu lepas. Ini kerana semua pelajar pandai menggunakan whatsapp berbanding dengan servis lain. • Tidak • Terlepas satu dua information sebab banyak sangat chat nak scroll			

Selain tinjauan melalui *google form*, pensyarah juga meminta pelajar menulis refleksi pada padlet tentang pengajaran dan pembelajaran secara dalam talian menggunakan whatsapp. Jadual 3 menunjukkan refleksi yang telah dibuat oleh pelajar.

Jadual 3: Refleksi pelajar UHAK 1012 seksyen 44 terhadap pengajaran dan pembelajaran menggunakan whatsapp

Kelas pada hari tersebut berjalan dengan baik dan menarik kerana ada aktiviti yang menyeronokkan dilaksanakan. Pembelajaran juga mudah difahami walaupun melalui whatsapp sahaja.	pembelajaran yang menyeronokkan dan tidak membosankan. 100%would like a class like this afterwards.
Kelas hari ini telah mengajar saya untuk memberikan teamwork yang baik dalam kerja kumpulan dan atasi konflik. kelas hari ini sangat menyeronokkan kerana kuiz di edpuzzle yang dr sediakan.	Pembelajaran harini sangat menyeronokkan kerana adanya komunikasi dua hala anta dr dan pelajar dan dr juga memberikan kami quiz yang membuatkan kami lebih fokus dalam pembelajaran dan mudah mengingati pelajaran yang diajari.
saya suka sangat kelas harini sbb kreatif sbb ada video yang menarik dan semua orang berinteraksi untuk memberikan pandangan	I think today's class is fun because there are many activities to do and we have learned many things about teamwork. I feel like this class is different than when we were in class physically because

	students can participate more especially for the one who are afraid to speak. Hence, it is more effective when we can involve ourselves online rather than just listen in class.

Kesimpulan

Berdasarkan tinjauan menggunakan *google form* yang dibuat, hampir separuh pelajar menggunakan data dari telefon untuk mengikuti kelas secara dalam talian. Ini menyebabkan pelajar tidak dapat mengikuti sepenuhnya 2 jam kelas secara secara dalam talian jika menggunakan platform seperti Webex dan Zoom. Oleh itu, pensyarah banyak menggunakan platform alternatif iaitu Whatsapp untuk menjalankan kelas secara dalam talian. Berdasarkan data, sebahagian besar pelajar suka dengan pengajaran dan pembelajaran secara dalam talian menggunakan platform Whatsapp. Refleksi pelajar dari padlet dan eppp pengajaran menunjukkan pelajar berpuas hati dan seronok dengan aktiviti yang dijalankan secara dalam talian menggunakan Whatsapp. Ini menunjukkan pembelajaran aktif masih boleh dilaksanakan walaupun pembelajaran berlangsung secara dalam talian.

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Competition as an Effective Tool for Experiential Learning

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Highlights: In this project, a group of students was formed from several engineering schools with a different academic background to participate in a robotics competition. The group consists of junior and senior members. The junior members were from first-year students while the senior members were from second-year students. Every year, the project started in September and ended in August the following year. The project instills both hard-skills and soft-skills in the students. The project demonstrated a successful implementation of an experiential learning approach towards student learning in the engineering field.

Key words: Competition; Volunteerism; Teamwork; Experiential Learning.

Introduction

ROBOCON is an annual event organized by ABU (Asia Broadcasting Union), dedicated to university students in Asia-Pacific [1]. The competition aims to unleash talent and establish a friendly relationship among youths who are interested in robotics. Every year, the Ministry of Higher Education in collaboration with Radio Televisyen Malaysia (RTM) will host a ROBOCON competition at the national level to select a team representing Malaysia to participate in the ABU ROBOCON competition internationally. The achievement of the ROBOCON UTM team at national and international competitions has been very profound. At the national level, the ROBOCON UTM team emerged champion (eight times), the best technology award (four times) and the best engineering award (three times). At the international level, the ROBOCON UTM team has emerged as champion (once), runner-up (once), Toyota awards (once), Panasonic awards (once), Mabuchi motor award (once), best design award (once) best idea award (triple) and best engineering award (twice).

Learning by doing. The framework for the principle of experiential learning [2] is this. Experiential learning focuses on the premise that getting experiences is the best way to understand things. In four steps, the principle of experiential learning is described as concrete learning, reflective observation, abstract conceptualization and active experimentation. The first two steps of the cycle include understanding an experience, while the second step focuses on the transformation of an experience. Concrete learning is when a new insight is received by a learner. The reflective observation comes next, where the learner individually reflects on their experience. To focus upon what this experience entails, they use the prism of their experience and comprehension. As the learner forms fresh ideas or changes their thinking based on the experience and their reflection on it, abstract conceptualization takes place. Active experimentation is when new concepts are introduced to the world around them by the learner. This approach may occur over a short period of time, or over a long period of time.

Experiential learning is also closely related to the three learning theories which are cognitive learning theory, constructivism learning theory and connectivism learning theory [3]. The cognitive theory implies that internal thinking and external influences are both an integral part of the cognitive process at the most fundamental level. The philosophy of constructivism is based on the premise that students ultimately develop their own learning based on their previous experience. One of the newest theories of educational learning is Connectivism. It focuses on the idea that when they shape ties, individuals learn and evolve. This may be interactions with one another or connections in their lives with their positions and responsibilities.

Concrete Learning

Activity that contributes to concrete learning is UTM Robocon Exhibition as shown in Figure 1(a). Every year, we organize an exhibition about the activities of the UTM Robocon team. The venue for the exhibition is at Dewan Sultan Iskandar (DSI), UTM. Senior members play a video to introduce the UTM Robocon to students who visit the exhibition at DSI, UTM and showcase the robots built from the past year's competition. The purpose of the exhibition is to reveal the UTM Robocon to new UTM students and to promote the program that will be held, namely the Autocar Workshop.

Figure 1: Experiential learning activities related to (a) concrete learning phase, (b) reflective observation phase, (c) abstract conceptualization and (d) active experimentation.

Reflective Observation

After conducting the UTM Robocon Exhibition, the next activity is Autocar Workshop (Figure 1(b)). This workshop aims to provide exposure to UTM students about the knowledge and skills needed to build an Autocar. Three main aspects of robotics are revealed to the participants, namely mechanisms, electronics and programming.

Abstract Conceptualization

There are two activities involved in this stage which are the Autocar Mentor-Mentee Program and Autocar Competition as shown in Figure 1(c). All registered new members consisting of UTM students are divided into nine groups and led by a UTM Robocon member to learn how to build an autocar that will be used in the current UTM Robocon Autocar Competition. Participants are taught to design electronic circuits and make soldering donut board. They are also taught programming for robots that will follow a line. Participants design their own autocar mechanism and build their robots with mentor guidance.

After the mentor-mentee is completed, the participants will participate in the Autocar Competition. The competition is held to provide a platform for all mentees to showcase their efforts after the mentor-mentee training for about three weeks in a row. A preliminary round is held to select participants who qualify for the knockout round (Elimination Round). After that, quarter-finals, semi-finals and finals are held to select the winner of the Autocar Competition.

Active Experimentation

This is the most exciting phase of experiential learning for all of the Robocon team members in which they are going to apply their knowledge and skills in developing the best robots for the Robocon Malaysia competition. The team is normally broken into three departments, i.e. mechanism, electronics and programming. Each department is responsible to develop one specific component of the robot. The apex of the experiential learning in this project is when the team participates in the real competition as shown in Figure 1(d).

Conclusion

Experiential learning is one of the important learning approaches in the student learning process. In this project, we have shown that through a structured involvement in an engineering competition, students can achieve and experience all elements in experiential learning which are concrete learning, reflective observation, abstract conceptualization and active experimentation.

Acknowledgment

We are grateful to the Universiti Teknologi Malaysia and Faculty of Engineering for giving support to the team throughout the preparation of the competition. We also would like to express our high appreciation to the School of Electrical Engineering for providing us with a laboratory for us to do all preparations.

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Soli Fix Game

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Highligths: The Soli Fix Game is a collaborative project between Physics lecturers of Kolej Matrikulasi Kelantan and Kolej Matrikulasi Kejuruteraan Kedah. The aim of the development of the Soli Fix Game is for the Physics educational purposes. The game was designed to improve students' ability to memorize the SI Prefixes which is taught in basic elementary physics topic. The SI Prefixes concept is fundamental in Physics subject that it is applied throughout the semesters especially in matriculation level. The Soli Fix Game was developed by using the C++ programming language that contains an element of solitaire.

Keywords: collaborative; educational; improve; prefix; C++.

Introduction

A game is a type of play where participants follow defined rules. (Houghton et al., 2013) discusses educational games as the utilization of games to support teaching and learning. Games can be used as a support tool to complement traditional teaching methods to improve the learning experience of the learners while also teaching other skills such as following rules, adaptation, problem solving, interaction, critical thinking skills, creativity, teamwork, and good sportsmanship. Learning should not feel dull and it should not only mean rote memorization where students learn and grasp concepts through repetition or cramming. Teachers can take advantage of the energy and innovative thinking that is provided by using technology in learning to improve student performance. (Victor et al., 2017).

Initially, the words "Soli Fix Game" came from the combination of the word Solitaire Game (PC Game) and Pre Fix (Sub topic in physics) respectively. The ideas were existed after a few class session. From our observation and experience with our students, it is found that most of them face difficulties in understanding and memorizing the concept of Pre Fixes. Some students even cannot write prefix at all. This is very worrying, because Pre Fix is the elementary topic in Physics that every students must be familiar with before proceed to other topics. An action must be taken to reduce the problem.

Content (Project or Innovation)

The objective of the Innovation

The objective of the innovation is to help students to identify and memorize the symbol and value of each prefix. Besides, we hope that the Soli Fix Game will be able to improve students' understanding of converting the Soli Game while solving Physics-related problems. Furthermore, by it is a stress-relieving activity.

The novelty

The Soli Fix Game idea retains 100% original features and functionality by inspiring the Solitaire Card Game design. Besides, the C++ programming language was 100% developed by us. Moreover, it has a colorful and pleasing music background which were also designed by us.

Innovation impact

It used to become as a teaching aid to assist students in memorizing all the Prefixes that are commonly used in Physics and Engineering subjects. We allow every student in our tutorial class to download the game via Google play store in their own gadget. Due to this, the prefix-related topics will become easier and at the same time it can increase students' interest in the subject. Furthermore, students can write the prefixes without facing difficulties anymore.

Market Potential

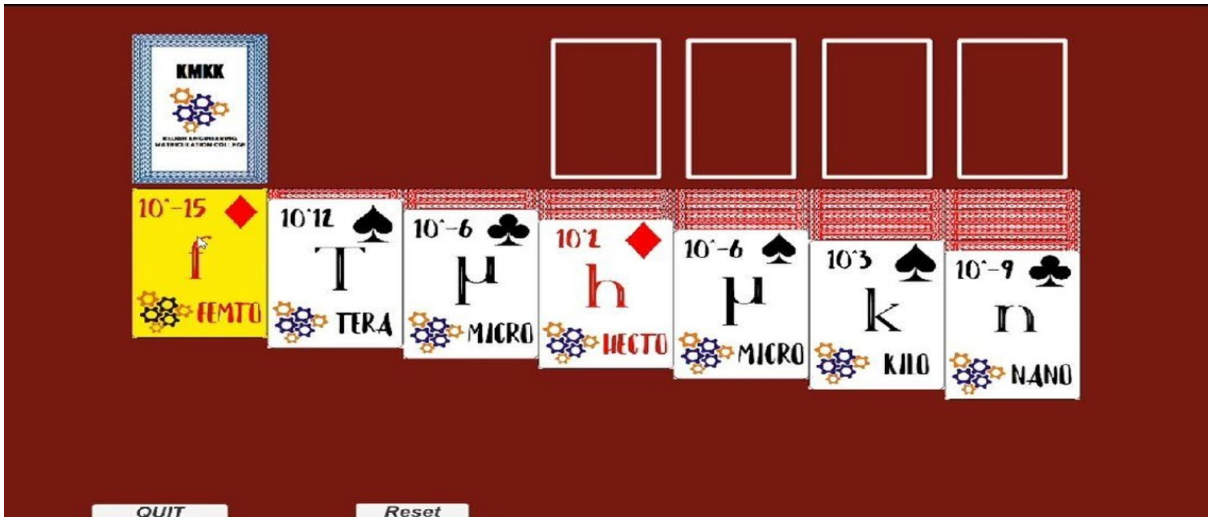
The Soli Fix Game is believed to have a huge potential in the market especially in Science and Technology Education Field. For the practicality and usefulness wise, the Soli Fix Game is now available in Google Play store which allows

students from all over the world to download the apps in their gadgets especially hand phone for educational purposes at anytime and anywhere. Below is our Soli Fix Game address that you can access via Google Play store: .https://play.google.com/store/apps/details?id=com.Prefix.MyPrefix.

The Research methodology

The researcher has divided the studies into two part which are product design and its implementation. The Soli Fix Game is designed as a unique teaching aid that can accommodate the students need. Moreover, the game also can be used as an interactive approach in helping students to master the topic. The C++ language has been applied to design the game. To implement the application of the Soli Fix Game in a tutorial class, first researcher was asked the students to download the Soli Fix Game apps via Google Play store in their own hand phone. Then the researcher demonstrated how to handle the game to students. 13 students were selected to be involved in this study to test their understanding of the SI Prefixes based on the working principle of this Soli Fix Game. The tests were performed twice; the pre-test before exposure to Soli Fix and the post- test after exposure to Soli Fix Game.

FIGURE 1 : Layout of the Soli Fix Game



Sampling

For the purpose of sampling, a total of 13 students (one class) are selected from a population of 45 students (3 classes) of the Kolej Matrikulasi Kelantan, which physics is one of the subject in their course. The samples are consists of weak, moderate and excellent students.

The samples are tested with pre-test questions. The test is carried out to evaluate the students existing knowledge on the topic of Pre Fix. Then teaching and learning process about the topic is conducted over two weeks. After completion of teaching and learning process about he topic, the samples of students are tested by giving the post-test question.

The score for both test are analyzed by using SPSS software to compute the mean score of both tests and Alpha Cronbach (α) value. Then the comparison between the mean scores for both test is analysed. All the score values are expressed in the form of percentages. The Alpha Cronbach (α) value is compared with alpha Cronbach level(0.05). This is to determine whether there is any change or improvements on the chosen topic.

Table 1: Pre-test and Post-test results for 13 students of KMKT

Student	Pre_Test	Post _Test	Different
1	30	60	30
2	20	60	40
3	40	70	30
4	30	50	20
5	50	40	-10
6	40	70	30
7	60	50	10

8	40	50	10
9	50	70	20
10	50	60	10
11	30	50	20
12	40	60	20
13	60	70	10

Finding

The development of Soli Fix Game involve the assembly the C++ programing. To play the Soli Fix Game is same with the original solitaire game. The goal of the game is to arrange the card in order from smallest value of prefix (FEMTO) to biggest value prefix value (TERA).

Through playing the Soli Fix Game, students managed to improve their understanding in the Prefix-related topic. By understanding the Prefix topic, it's easier for them to study other topics in physics.

The finding showed significant difference at the mean scores of pretest's students achievement with the score mean of the post test. The finding also showed that the mean score of post-test exceeded the pre-test mean score by 16.92. The result of paired t-test showed a significant value (0.002). Which was less than the value of alpha (0.05), a=0.002 with t(12)= 4.08.

The SPSS software was with alpha value for the instrument was set up at a=0.002. As a result, this work demonstrated Solli Fix Game that successfully improved students' understanding of the SI Prefixes concept.

Award received

Bronze Medal (MY SI PREFIX) in Icompex 2020.

Our paper has been short listed and was Presented in PLC convention (BMKPM) at KMKt –P Kat Game (9th Sept 2020).

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Keyword Application for Teaching and Learning Balaghah in Anwa' Tashbih

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Highlights: Anwa' tashbih is one of the titles found in Arabic Language subjects in the field of balaghah. This method makes it easier for students to memorize and then facilitates them to answer the Sijil Pelajaran Malaysia examination questions. A total of 13 students from Sekolah Menengah Kebangsaan Seri Raub, Raub were involved in this action research. The proposed method used word abbreviations which were then developed into interesting sentences that enabled the students to memorize and learn. This method aimed to solve problems related to confusion in identifying mursal mufassal, mursal mujmal and muakkad mufassal.

Keywords: Arabic Language, Anwa' Tashbih, Action Research

Introduction

أنواع التشبيه (ANWA' TASHBIH) is a way to facilitate students' understanding regarding the concept of discarding or maintaining the Adat Tashbih and Wajah Syabah. The concept of word abbreviations is chosen to make it easier for students to better understand and memorize **أنواع التشبيه**(N Ahmad, 2003). This method aims to solve problems related to confusion in identifying mursal mufassal, mursal mujmal and muakkad mufassal. Before this method was introduced, many students make mistakes in recognizing the types of tashbih as they have different skill levels and also learning difficulties. Through this method, students not only exposed to fun learning, but able to achieve student aspirations in thinking and knowledge skills. The implementation of this method has had a positive impact on improving the effectiveness of teaching and learning. Preliminary evidence of using this method indicated that students have successfully answered SPM questions related to the types of tashbih.

Novelty

This innovation is reformed by highlighting the conversion of games in the mounting board to the form of apps. Students only need to search on Google play and type ActionBrosGamesStudio. Students will find the apps with the name 'Anwaa'ut Tashbih'. This game is only available in the Google play store and not in the apps store. Students will have more fun when learning methods in the form of apps.

Creativity

أنواع التشبيه (ANWA' TASHBIH) is a way to facilitate students' understanding regarding the concept of discarding or maintaining the Adat Tashbih and Wajah Syabah. The concept of word abbreviations is chosen to make it easier for students to better understand and memorize **أنواع التشبيه**(N Ahmad, 2003).

Innovativeness

Improvement in the effectiveness of PdPc involves:

- ✓ Student-centered PdPc
- ✓ Time-effective
- ✓ Increasing level of satisfaction of teachers and students
- ✓ PdPc is carried out in fun learning approach

Applicability

This innovation is very relevant to NALI. Since the Covid-19 pandemic is plaguing our country now, students only need to learn ANWA 'TASHBIH from the apps created through fingertips only. Students are able to understand the learning content, play with fun applications and learn in a convenient way.

Impact

The teacher found that the use of the WORD ABBREVIATION concept gave high impact to the students when answering the questions related to أنواع التشبيه (ANWA 'TASHBIH). Students can answer correctly and quickly. The implementation of this method also has positive impact in improving the effectiveness of teaching and learning. From preliminary study, it was proven that students have successfully answered SPM questions which related to the types of tashbih after using this method. The positive impact of this innovation is expected to be very helpful and beneficial to the inventors.

Content (Project or Innovation)

Innovation Objectives

In general, the purpose of conducting this action research is to inculcate interest in learning Arabic Language subject in depth which can improve achievement in examinations. While the specific objectives of this study are:
1. To help students to memorize the concept of Adat Tashbih and Wajah Syabah and discard Adat Tashbih and Wajah Syabah
2. To help students memorize the concept of discarding Adat and Wajah easily and accurately
3. To facilitate students to memorize by associating the concept of word abbreviations to daily stories
4. To promote student-centered teaching and learning process
5. To carry out teaching and learning process in more fun approach

Research Methodology

The action research was adopted from the Kemmis and Mc Taggart (1988) covering aspects of planning, acting, observing and reflecting. Figure 1 depicts the model of Kemmis dan Mc Taggart's action reserach.

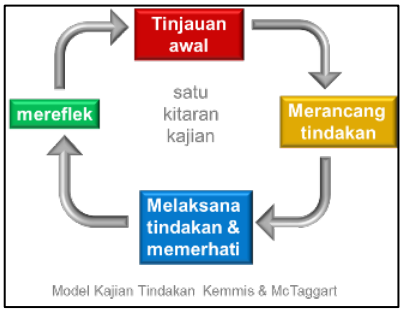

Figure 1 : Action research model of Kemmis and Mc Taggart (1988)

A total of 13 students of Form 5KAA (weak and moderate in achievement) in Sekolah Menengah Seri Raub were selected in this study. The research instruments used were pre and post-tests.

Intervention Introduced

To implement the keywords for Anwa' Tashbih, several steps were taken including:

1. Introduce the keywords for Anwa' Tashbih to the students.

Figure 2: Anwa' Tashbi

2. Distribute Anwa' Tashbih training to students (target group).
3. Students are asked to answer the exercise based on the keywords.
4. Students are asked to read each question and give the correct answer.

Research Findings

Pre-Test

A set of pre-test questions containing 15 questions was given to Form 5KAA students to identify their proficiency level in answering questions related to anwa 'tashbih. The time given to the students to answer the question was 8 minutes.

Post Test

A set of post-test questions were given to the students after they attended the PdPc session using keywords. The time given to students to answer the question was also 8 minutes. The success of this study was evaluated based on the post-tests to the target group to identify the level of effectiveness of the actions taken to assist students' proficiency on the topic tested. These post-test questions were similar to those of pre-test which contained 15 questions related to the title Anwa' Tashbih.

Figure 3 displays the comparison between pre- and post-test scores among students.

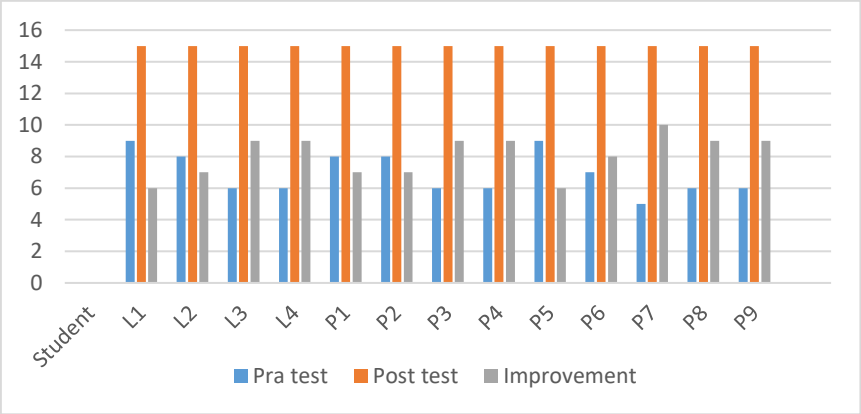

Figure 3: Comparison between pre and post-test scores

Based on Figures 3, it proved that all students are able to succeed if they are guided by the teachers using effective techniques or methods. Based on the data obtained, it clearly showed high post-test improvement over the pre-test. Overall, all students were able to answer all 15 questions correctly.

Discussion

This action research provides good reflection and impact to the teachers. Moreover, tools, such as board and Anwa' Tashbih application, can provide experience to the respondents in helping them to memorize a subject that has been taught. This is because the techniques to memorize and materials available will affect a person's memory (Hanafi Ismail and Sadali Othman, 2001). In fact, in the teaching and learning process, students are always exposed to new information and they will focus on this new information. It will take over the old information and cause the old memory to decay (Tang Geok Ling, 2005). Therefore, teachers can use board and Anwa' Tashbih application as teaching assistance that can be fully utilized to improve the teaching and learning process in the classroom.

Conclusion

The use of board and applications has also proven to be effective in increasing students' interest in learning. In fact, it can also reduce confusion, encourage active student involvement during PdPc sessions and can minimize disciplinary problems among students. Based on the effectiveness of use of board and applications in improving the level of students' memory of Anwa' Tashbih, it is proposed that further studies should focus on the effectiveness of the use of board and applications in PdPc for balaghah, soraf and other grammars, such as fi'il sahih and mu'tal, tawabi', maqsur manqus dan mamdud.

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Online Engagement on Pathway towards Professional Town Planners

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Highlights: Bachelor of Urban and Regional Planning Program (B.URP) in Universiti Teknologi Malaysia conducted an online engagement with first year and final year students on the Pathway towards Professional Town Planners. The online engagement session comprises a talk and discussions on the introduction to the program, town planning profession and placement, and pathway towards Professional Town Planners in Malaysia. This session is important created specially to the students who enrol to a professional course to advise them to better prepared with town planning knowledge and skills during bachelor studies. By having this session twice, during first year and one more again at final year, students is expected to be more directed to applying for professional Town Planners after graduating.

Key words: Creative online engagement; new ideas, professional pathway; lifelong learning

Project Objective

The main purpose of the online engagement session is to better explain to the first-year Bachelor of Urban and Regional Planning (B.URP) student they are actually enrolled to a very prestigious professional program and soon they will become a professional town planner in Malaysia. By enrolling to a professional course that is accredited by the Board of Town Planning Malaysia (LPBM), they need to better prepare with a clear pathway towards professional Town Planner while in bachelor degree and after graduate soon. This session also will be repeated again to final year B.URP students.

NALI Approach

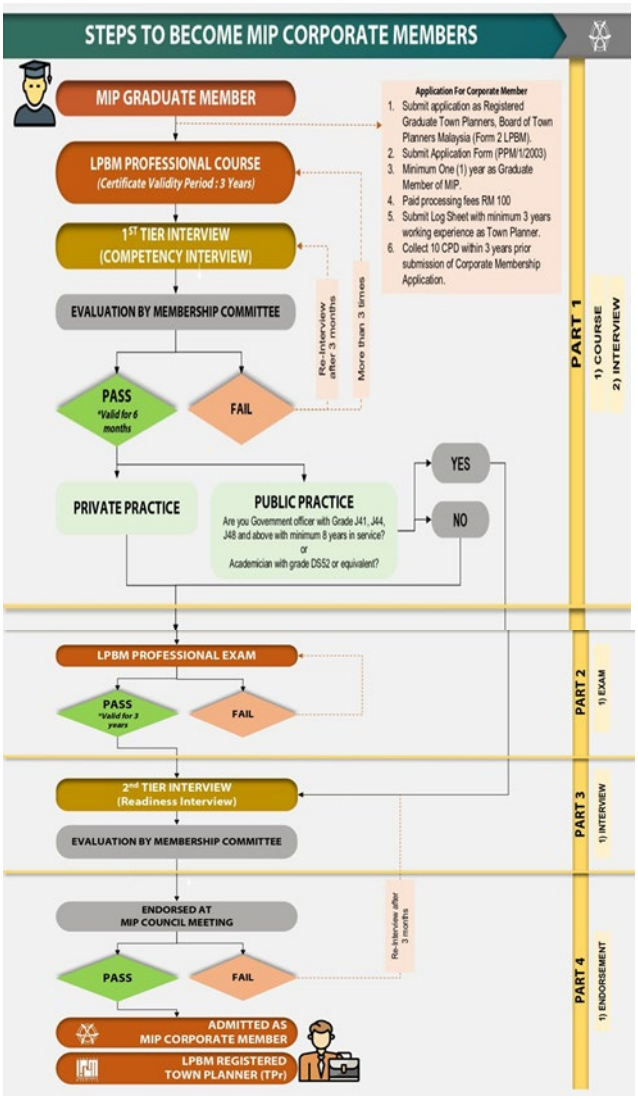
With respect to NALI2020, Future Ready Educators (FREE), this engagement session is highly relevant to the sub-theme of Creating a Culture and Condition for Innovation and Change. The overall online engagement session is arranged by TPr. Dr. Siti Hajar Misnan (a senior lecturer in the department and also a Malaysian Institute of Planners Southern Branch (MIP SB) Committee Member) with the help of Studio 1 supervisors and final year Final Year Project 2 (PSM2) supervisors (refer to Figure 1).

Figure 1: The latest online session with first year BSc. URP students on 19 October 2020

Due to Covid-19 pandemic situation, the engagement session was conducted online. The session normally will involve the first-year students with an approach to introduce the program and their future profession. While another session is with final year students with an approach to advise them to be prepared to professionally work in the industry and to remind them the process on how to apply professional Town Planner. We also manage to invite practicing TPr. from our alumni to share their thoughts and experiences to motivate the students.

This session is creative and innovative as it roles to engage student to their professional pathway. The session consisted of the introduction to the URP program as a professional program, sharing the list of lecturer with TPr. and their expertise, role of the Board of Town Planning Malaysia and Malaysia Institute of Planners (MIP), related acts that governed the profession, scope of job and town planners' placement in Malaysia and the overall pathway towards professional town planner (refer to Figure 2). The session was conducted using online platform like Webex, Google Meet or Zoom, sharing some information in slide show (Lin, 2017) and in eLearning, and getting feedback from student online and also through eLearning tolls.

Figure 2: Professional Qualification Application Process to become MIP Corporate Members
Source: Malaysian Institute of Planners website at https://mip.org.my/



By completing this session, the department hope that, soon more our graduates will be better prepared with knowledge and skills in Bachelor of Urban and Regional Planning and they also more guided to applying for professional Town Planners and will act professionally to the profession.

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e-Hybrid Studio: An Integrated and Virtual Entrepreneurship Development Platform

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Highlights: Malaysia has initiated the Entrepreneurship Action Plan of Higher Education Institutions (2016-2020) to promote incorporation entrepreneurship education and development in institutions of higher learnings to nurture and sustain entrepreneurial engagement among graduates' mindsets. However, the difficult question to answer is 'What is next?', and Who will handhold the students to the next step? Thus, this research idea designs a new virtual incubator model, e-Hybrid Studio which provides an explicit guidance to the start-ups among students, virtually without a wall to accelerate the performance in both short and long term. The e-Hybrid Studio has contended that the key competencies of a virtual incubator clustered under 7 phases: Selection, Ideation, Market validation, Prototype and Product Development, Launch, Accelerator, and Support System.

Key words: Entrepreneurship, e-Hybrid Studio, 7 phases

Introduction

Malaysia has initiated the Entrepreneurship Action Plan of Higher Education Institutions (2016-2020) to promote incorporation entrepreneurship education and development in institutions of higher learnings to nurture and sustain entrepreneurial engagement among graduates' mindsets. However, the difficult question to answer is 'What is next?', and Who they should consult? Who will handhold the students when they have fascinating idea but lack of business knowledge and skills, especially those from engineering or technical backgrounds? Thus, this research idea aims to fill the existing gap by designing a new virtual incubator model, e-Hybrid Studio which provides an explicit guidance to the start-ups among students, virtually without a wall in order to accelerate the performance in both short and long term. The e-Hybrid Studio has contended that the key competencies of a virtual incubator clustered under 7 phase; Selection, Ideation, Market validation, Prototype and Product Development, Launch, Accelerator, and Support System. The e-Hybrid Studio too offered comprehensive insights and specific skills and knowledge to start-ups among students who are facing challenges in their business journey. The studio will provide a conducive entrepreneurial environment which shortens the learning curve of the start-ups and accelerate their performance. In conclusion, e-Hybrid Studio can be defined as a catalyst tool for either individual, regional, or national economic development.

Objectives of E-Hybrid Studio

This model has been designed to achieve the following objectives:

i. To foster an entrepreneurial culture, by providing the start-ups among students with opportunities to transform their business ideas to reality
ii. To provide a virtual conducive working environment to the start-ups among students to nurture their innovative ideas.
iii. To liaise with private and public sector funding sources, government agencies, industrial associations, chambers of commerce and industries to provide facilitation and networking for start-ups among students' companies.
iv. To shorten the learning curve and accelerate the performance of start-ups among students in Malaysia.

Novelty

e-Hybrid Studio is a virtual incubator model, which is developed to provide a broader landscape of virtual support to start-ups among students, which provides advanced ecosystem via online while utilizing the technology advancement. In doing so, these platforms aim to accelerate the growth of newly emerging ventures among students. This model is very novel because it has its own unique 7 criteria to hybrid as a start-up and graduate in a shorter period just by communicating virtually with E-Hybrid Studio.

i. For E-Hybrid Studio:
   - Ensure only the right one join the E-Hybrid Studio
ii. For Start-Ups among Students:

- Shorten the learning curve and avoid fall in the valley of death
- Accelerate the performance of start-ups
- Communicate virtually

Creativity

e-Hybrid Studio is designed to act as a mediator of network, funding, coaching, and finding talents especially during this COIVD-19 pandemic, where most of the activity have changed from physical to online. Besides, E-Hybrid Studio has closed the gap on the dependency and geographical barrier between start-ups among students and the entrepreneurial support. The most creative element counts when it contributes the ongoing digital paradigm shift.

Innovativeness

e-Hybrid Studio has contended that the key competencies of a virtual incubator clustered under 7 phase; (1) Selection, (2) Ideation, (3) Market Validation, (4) Prototype & Product Development, (5) Launch, (6) Accelerator, and (7) Support System. The target customers for e-Hybrid Studio starts from students, then will be expanded to starts-ups, and nascent entrepreneurs who have idea and need guidance to develop their business and shorten their learning curve. At the same time, e-Hybrid Studio provide a platform to build a strong entrepreneurial network among the start-ups among students and others. The model aimed to accelerate the growth of newly emerging ventures among students, by utilizing tools such as video conferencing, learning management systems, and shared document as main communication tools in e-Hybrid Studio.

Drawings of Innovation

Figure 1: Seven stages in e-Hybrid Studio

Research Methodology

This model is developed by using the secondary data and literature in incubation field. Resource-based View (Barney 1991), and Knowledge-based View (Nonaka et al., 2000) has been employed in this model development exploring the capability of internal and external resources on innovation in a firm. However, the process of new venture creation is very vital when a start-up intent to turn an idea or an opportunity into value (Moroz and Hindle's, 2012). Therefore, e-Hybrid Studio has integrated resources, knowledge and process by categorizing the model into 7 phases: Selection, Ideation, Market Validation, Prototype & Product Development, Launch, Accelerator, and Support System. The model designed to accelerate the growth of newly emerging ventures, by utilizing tools such as video conferencing, learning management systems, and shared documents, as well as building customized software.

Finding and discussion

E-Hybrid Studio has high potential of commercialization not only in Universiti Teknologi Malaysia, main Malaysian market, but also globally. In conclusion, E-Hybrid Studio can be defining as a catalyst tool for either individual, regional, or national economic development.

Rewards

e-Hybrid Studio has been rewarded two times when it was in preliminary stage and was awarded:

- Gold Award in Innovation Product Launching and Entrepreneurship Competition (INNOPLEN2019) National Level (27th & 28th of March 2019)
- Silver Award in 2nd Digitalised International Invention, Innovation & Design (IIID) Competition UiTM 2019 (29th of August 2019)

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Monitoring of Three Different Electrical Output Parameters Using the Concept of I2C Connection on Solar Panel Monitoring System

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Highlights: The I2C is a synchronous, multi master, multi-slave, serial communication bus invented by Philips Semiconductor. It is widely used for intra-board communication that allows multiple modules to be connected to same pin but have different address or identification id. By using this connection multiple connection of the I2C module can be connected to the same board. This project can measure three differents electrical parameter from different source by using module of INA219. With additional of Internet Of Things (IoT) technology makes live monitoring and measurement without the need for human and computer interaction. The data from the measured parameters are displayed on the smartphone and can be read and analysed directly. The parameters monitored in this project are voltage, current and power.

Key words: solar panel; esp8266; internet of things

Introduction

This project is capable of measuring several parameters of solar panel output and its surroundings. From the solar panel, the INA219 current and voltage sensors will detect the total voltage, current and power generated. For this project three INA219 will be connected to the solar panel monitoring circuit to expand the function of the system. The INA219 will be connected in I-Squared-C (I2C) connection. This connection allow different parameter feed into one circuit. In this system also have ambient temperature and humidity measurement, it will be detected using DHT11 sensor and brightness through light sensor. All these parameter data are updated at any time via the internet connection to give users live monitoring update. This project makes it easy for users to analyze the parameters of solar panel remotely using the Iot based technology. All of this parameter will displayed on a graphic user interface build using Blynk. This allow user to monitor it on their own smartphone.

Application

This project can be used in multiple platforms such as regular application monitoring solar panel and other power generation component. Beside that it is also can be used in education and industry platform. User will just only a single board equipped with a different INA219 module that connected using I2C connection that allow multiple parameter measured in on circuit.

User can monitor their power generated and planning for preventive maintenance session, repairing service and upgrade. This is because when user can monitor the system, they can easily monitor if there any abnormal reading from their solar panel. These abnormal readings maybe come from defect or dirty solar panel.

While in education this project can be used in learning and teaching process. Lecturer and teacher can show how environment can be a factor in power generated. Course like Renewable energy is one of the suitable course that can use this project. For industrial user they can use this project to monitor their solar panel system station. They can monitor the power generated and battery level in their system.

Objective

Objective of this project is building circuit that can measured multiple parameter by using three INA219 connected using the I2C connection. In this circuit a microcontroller is use to control all the input and output components. A

code is built to receive and analyse the parameter from multiple INA219 and upload the data to the cloud using Wi-Fi. For displaying parameter on to smartphone an application called Blynk is used to create the graphic user interface for this project.

Project Methodology

Process in developing this project is shown in Table 1. This project consists of two section hardware and software.

Table 1 : Project methodology

Process	Details
Analyze	Market Needs Domestic Needs
Design	Hardware - Circuit using Proteus Software - Graphic user interface using Blynk
Development	Hardware - Ecthing Drilling Soldering Porotype Test Run Software - Design Graphic User Interface
Testing	Parameter on real condition

In this project the main components are the microcontroller and the current sensor INA219 that connected using I2C connection. The I2C is a synchronous, multi master, multi-slave, serial communication bus invented by Philips Semiconductor. It is widely used for intra-board communication that allows multiple module to be connected to same pin but have different address or identification id.

The microcontroller WEMOS D1 Mini is module based on chipset ESP8266 to support the WIfi, IoT and stack TCP/IP function. This module has one analogue port anf 11 digital ports. It runs from 5V or 3.3V and all port are set to 3.3V logic level. The I2C connection pin is on the D1 and D2 pin. D1 for SDA and D2 for SCL pin. This pin provides I2C connections that support all I2C module.

For measuring parameter that connected to board, this project use INA219. This sensor is widely used to monitor current, voltage and power. The module monitors both shunt voltage drop and bus supply voltage, with programmable conversion times and filtering. It can sense across shunts on buses that can vary from 0 to 26vand the device drawing of 1mA of supply current only.

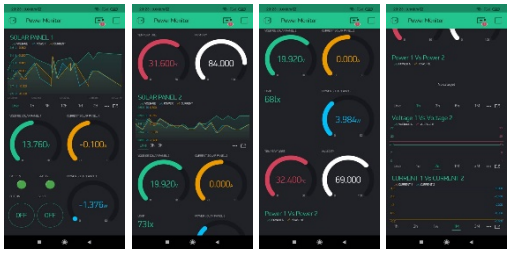
Market Potential

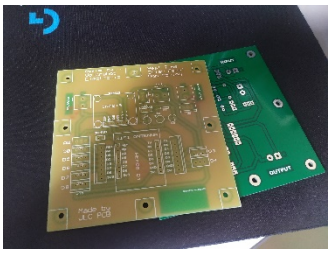
This project has a market potential for certain prospect such as small and medium enterprise that need a monitoring their energy power level monitoring for example, from solar panel, charged battery and other renewable energy. Besides that, a domestic user such as home or small office that have solar panel or other power generating component can also use this project to monitor their power level.

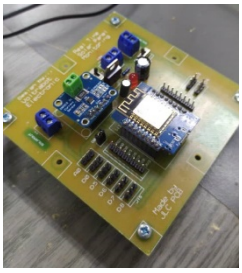
Novelty

This project first prototype has been registered on MYIPO, MYIPO Registration number: LY2020001046. For this project is an upgrade how the parameter measurement can be expanded to multiple value measurement by using only one board. The concept of the first prototype board has been also presented on Kedah International Multidisciplinary Conference (KIMCe 2019) and Malaysian Undergraduate Research Conference (MURC 2019).

Findings







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Students Engagement in Gamified Hybrid Service Learning for Computer Network Course

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Key words: service learning; gamification; students engagement;

Introduction (Project or Innovation)

Hybrid service learning, an emerging trend of combining online learning and service learning, has gained popularity as many educators are moving into online platforms. On the recent Covid-19 pandemic, has forced education systems worldwide to find alternatives to face-to-face instruction. As a result, hybrid service learning has been chosen as alternatives. Hybrid service learning holds the potential to transform both service-learning and online learning by freeing service-learning from geographical constraints, and by equipping online learning with a tool to promote engagement. The online community engagement is a key to the future of service-learning (Soria, K. M. & Weiner, B., 2013; Waldner *et al.,* 2010; Yusof *et al.,* 2018). Furthermore, online community engagement capitalizes upon the learning opportunity & solidify student learning of concepts through online platform. The online platform utilizes course management & technology features effectively. Therefore, there is a call for researchers in service learning to design learning activities effectively and promote student's engagement.

Despite the emerging trend of online community engagement, disengagement in online learning has been one of the challenges to community engagement and service learning. Particularly, students feelings of isolation, frustration and confusion has caused disengagement in online learning (Yusof *et al.,* 2017). Therefore, in implementing service learning through online platform, educators need to design learning activities that can engage students in their learning. Based on previous studies with current trends suggest that gamification elements integrated in online learning would engage students in learning (K. Kapp, 2014; Zichermann & Cunningham, 2011) and student service learning activities able to integrate gamification elements in their learning process. The common gamification elements proposed by Zichermann & Cunningham (2011) include points, levels, badges, and leaderboards were integrated in the online community engagement. Although hybrid service learning could easily be applied to various online learning activities, challenges arise when digitizing Computer Network Installation learning materials and learning activities for use online with educational applications (Yusof *et al.,* 2019).

Learning Activity Design (Project or Innovation)

The five stages of service learning, namely investigation, preparation & planning, action, reflection and demonstration & celebration proposed by Kaye (2004) acts as a baseline for this gamified online platform design. The gamified service learning is shortened as GAMESEL. Hence, this study examines undergraduate students' engagement in Computer Network Service Learning project that utilize Hybrid Type III, in a service learning partially online and partially onsite.

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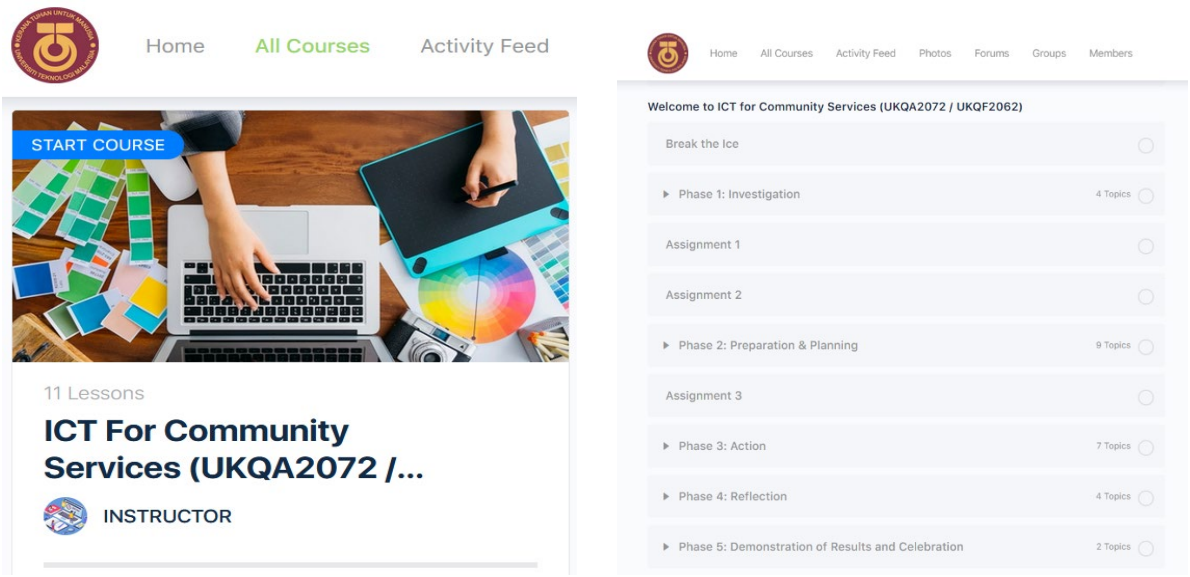

Figure 1: Gamify Hybrid Service Learning Platform (GAMESEL)

Figure 2: Gamification element experience points, badges, level and leaderboard

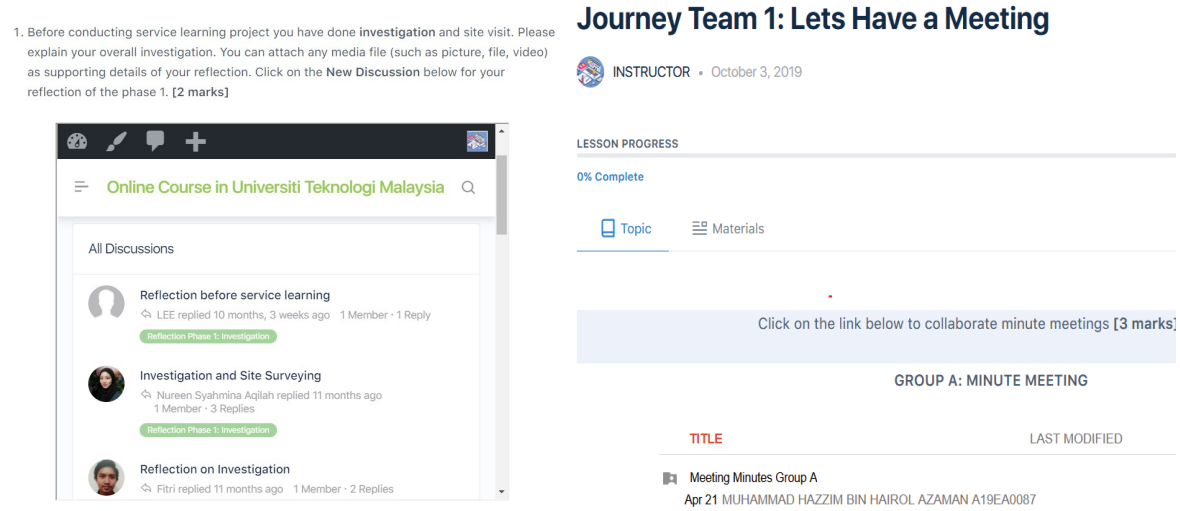

Figure 3: Online discussion and collaboration

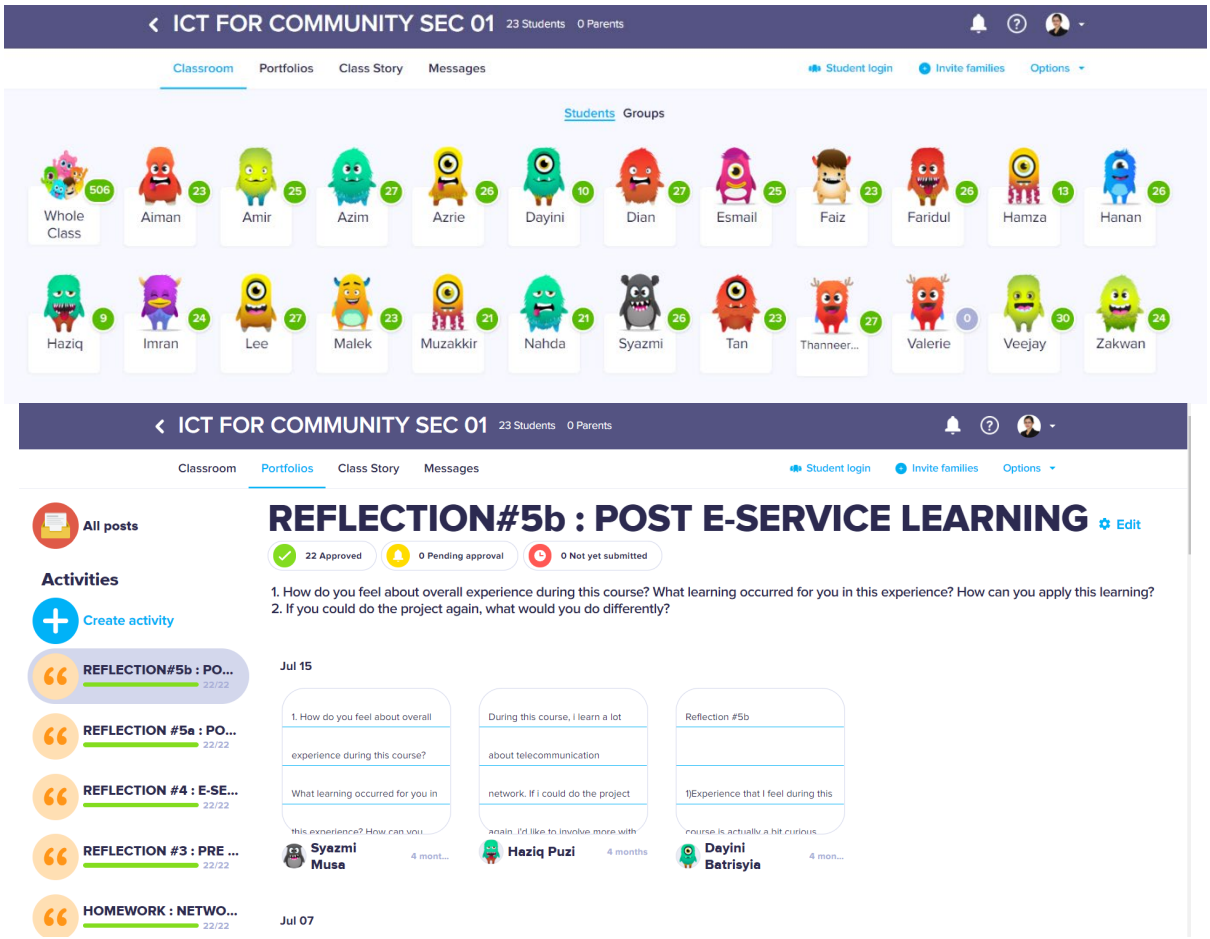

Figure 4: Community reflection

Content (Project or Innovation)

This study aims to design learning activities for enhancing student engagement through a gamified hybrid service learning (GAMESEL). From the learning activities we investigate the effect of GAMESEL activities towards students engagement. The course was taught as a Hybrid III e-Service Learning (blended) to enhance the course with inclusion of online discussion forum, e-portfolio and collaboration. The goal of GAMESEL was to utilize Hybrid III e-Service Learning (blended) and with that to analyze students' perception towards students engagement. The data were collected towards online activities data-log, survey questions and observation. Majority of the students reported higher learning outcome attainment in the learning process especially during the implementation of gamified hybrid service learning. The results from the study showed gamified hybrid service learning had a positive impact on students' engagement and generic skills.

Table 1: Frequency of students' structural gamification elements in GAMESEL

	Structural Gamification				
Student	**Badges 10**	**Points 25**	**Level 10**	**Leader board 5**	**Total 50**
S 1	5	14	5	1	25
S 2	5	13	5	1	24
S 3	3	15	5	1	24
S 4	5	15	5	1	26
S 5	5	14	5	1	25
S 6	7	24	5	2	38

S 7	5	15	5	1	26
S 8	5	16	5	1	27
S 9	4	15	5	0	24
S 10	7	28	5	2	42
S 11	5	15	5	1	26
S 12	5	17	5	1	28
S 13	4	16	5	0	25
S 14	7	21	5	2	35
S 15	4	16	5	1	26
S 16	7	20	5	3	35
S 17	3	15	5	0	23
S 18	7	32	5	4	48
S 19	7	24	5	2	38
S 20	4	14	5	1	24
S 21	7	22	5	3	37
S 22	4	16	5	0	25
S 23	5	17	5	1	28
S 24	3	15	5	0	23
S 25	4	13	5	0	22
S 26	5	14	5	1	25
S 27	5	15	5	1	26
S 28	7	29	5	4	45
S 29	5	17	5	1	28
S 30	3	12	5	1	21
S 31	3	15	5	0	23
S 32	4	14	5	0	23
S 33	5	16	5	1	27
Total	**164**	**574**	**165**	**39**	

The overall findings indicated that students have collected 164 badges, earn 574 points, 165 level and 39 leaderboards. The learning activities related with badges were collaboration and team work. Table 2 shows the rubric assessment for collecting badges associate with collaboration. Then, each student was analysed thoroughly and were classified into Schlechty's Levels of Student Engagement (2011). The frequency of each of these criteria namely Rebellion, Retreatism, Ritual Compliance, Strategic Compliance and Optimal Engagement were documented in Table 2 as shown below.

Table 2: Level of Engagement of Students

Level of Engagement	**Meaning**	**Range**	**Total Students**
Rebellion	Refusal to complete task, disrupts others and avoid	1 – 10	0

	completion of task with substitute actions.		
Retreatism	Disengagement from task; little to no energy present, but does not disrupt others.	11 – 20	0
Ritual Compliance	Participant is willing to complete work to avoid negative consequences even though meaning is not present.	21 – 30	12
Strategic Compliance	Work has little meaning or value to participant, but extrinsic results are valuable to participant.	31 – 40	13
Real Engagement	Task, activity, or work has clear meaning and immediate value to participant.	41 - 50	8
			33

Based on Table 2 it can be seen that 12 participants were in the category of Strategic Compliance in which the task given has little meaning or value to participant but the impact of the extrinsic rewards was valuable to the participants. It can be seen also 13 participants were in the category of Ritual Compliance which mean participants was willing to complete the task given to avoid negative consequences even though meaning was not present. However, only 8 students were able to reach the highest level, Optimal Engagement.

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