ABOUT IUCEL 2019

The 2019 edition of International University Carnival on E-Learning (IUCEL) will be held for the first time in the island of Borneo on 21 and 22 August 2019. Universiti Malaysia Sarawak (UNIMAS) is proud to be hosting the event. IUCEL acts as a platform to promote, explore, and share best practices and global expertise in e-Learning applications at all levels of learning institutions from all over the world. This year’s theme “Inspiring Innovations for Sustainable Futures” signifies the call for future-proof practices and innovations that are impactful to the community at large.
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VIRTUAL REALITY AND VISUALISATION IN IMMERSIVE LEARNING ENVIRONMENT (VR&V)

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Highlights:
The Virtual Reality And Visualisation In Immersive Learning (VR&V) was developed to leverage the elements of teaching and learning process. These elements include: imagination of learners, further exploration and developing the depth understanding of new knowledge. Mastering the course of Virtual Reality and Visualisation in online and immersive learning environment may foster the new realm of interactivity and reconceptualisation of the relationship between learners and knowledge. The learners may be provided with the concept of “Do It Yourself” (DIY), step by step in order for them to develop the prototype of VR headset during the course. This may overcome the high cost of VR technology, since this headset is compatible with smartphones. In the 21st century learning context, these attributes are significant in order to open the possibility for shared classroom experiences using low cost solutions and creating a culture of VR usage.

Keywords: virtual reality, learning environment
HUMAN COMPUTER INTERACTION PRINCIPLES: DESIGNING WITH THE MIND IN MIND

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Highlights:
This HCI course is included as one of the National Defence University of Malaysia’s (NDUM) Massive Open Online Course (MOOC) subjects. The main objectives for this course are to introduce some of the fundamental concepts, principles and guidelines concerning in designing the effective interface in application or system development. Besides, this HCI course introduces students with the aspects of user-centered design process besides usability principles and evaluation. The redesign of this course has won several awards including Gold Medal at e-Learning Carnival (eLC) Universiti Teknikal Melaka (UTeM), and Bronze medals at e-Content! Development (eCondev), Universiti Teknologi Mara (UiTM), International University Carnival on E-Learning (IUCEL), Universiti Sains Islam Malaysia (USIM), and International e-Learning Carnival & Conference 2019 (eLCC), Universiti Teknologi Melaka (UTeM).

Keywords: Human Computer Interaction, User Interface Design, Interaction

Introduction
The Human Computer Interaction was developed to support the learning and teaching process on how to design users’ interface application and interaction involved in technologies. By understanding the techniques such as the rapid prototype design, the learners can implement it during the prototype development. Besides, the learners will be leveraging with knowledge acquisition on how to gather meaningful feedback from end users then evaluate it. Learners will also learn the principles and rationale of visual design selection; perception and cognition of learners and manipulation of informative feedback that come from users. This may give an effective contribution towards interaction design.

Content
Computer technology has evolved to suit the human usage. The way for human to interact with the computer is by the medium of User Interface (UI). The first ever interface that human used to interact with computer was Batch Computing. It consists of the input of a punched card. Thus, humans had no interaction with these early batch computers in real time. Then the UI changed to Command-Line (CL) that provides real time interaction by having request-response transactions. From CL, the interface gradually evolved to what UI look likes nowadays which is Graphical User Interface (GUI). The main purpose of GUI is to provide a user-friendly or human-centered usage of computers. Thus, the term Human Computer Interaction (HCI) is coined “on the snapshot of the interaction at the moment, usually on an individual, centered on the human-machine dyadic relationship itself.” (Kuutti & Bannon, 2014). Thus, to expose the students with HCI, a course about HCI was created.

This HCI course is included as one of the National Defence University of Malaysia’s (NDUM) Massive Open Online Course (MOOC) subjects. The main objectives for this course are to introduce some of the fundamental concepts, principles and guidelines concerning in designing the effective interface in application or system development. Besides, this HCI course introduces students with the aspects of user-centered design process besides usability principles and evaluation. With the guidelines, the students can have an idea to develop a better HCI for any given system as sustainability is a bane to HCI (Silberman et al, 2014).

There are several benefits of learning this course. Firstly, to produce students with preferred way of interactive online learning. Students will also benefit from the way of learning by connecting and sharing knowledge together. Furthermore, the modules are provided with the elements of multi-fusion such as video, animation, graphics and interaction to enrich learning process. Lastly, this module also leveraging the students of GEN-Z onwards to collaborate amongst themselves. With all the knowledge acquired, students can either update the existing UI of a system or they can also develop a new system that is user-friendly that well-equipped for future technology. As said by Vines et al (2015), the developing a new system is also a configuration for the user.

References


LEARNING AL QURAN COMPREHENSION, TRANSLATION AND USAGES USING A ‘MULTIPLAYER’ GAME (PAHLAWAN QARIN)

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Highlights: The Quran is the holy book for Muslims. Reading the Quran has become a daily practice or ritual for most Muslims (Islam religion believers). The Quran may be recited well by many but, very few understand what they recite. One will actually know when to use the Al Quran verses in certain situations if they know and understand the meaning of the verses. There are many verses of the Quran where Allah demands the believers to ‘read’, ‘understand’ and ‘implement’. It is worth studying it at a young age because learning the Quran needs reasonably good memory. Commonly known, children love to play especially with their peers, ‘digital game’ is one of the popular choices of these ‘new age’ children. Thus, we developed a ‘multiplayer’ desktop game called Pahlawan Qarin to attract the youngsters to learn the Quran meaning and usages. Digital games can be an attractive and engaging learning tools, motivators and generators of curiosity and as a result an effective means of optimizing student learning and performance in daily educational practice. Pahlawan Qarin can be used as an assisting tool for teachers in the Quran recitation and education topic that is also taught in Islamic Studies subject in schools. This game incorporates collaborative learning game (CLG) in which more than one player is able to play simultaneously (multiplayer feature) in a group or room using the internet connection (network). Based on observation and result gathered, students are proven to be interested in learning the Quran using this approach which is the digital ‘multiplayer’ adventure game.

Keywords: collaborative learning, desktop game, Al Quran, multiplayer, Islamic game

Introduction
In a Hadith Qudsi, Allah says: “Those that remember Me in their heart, I remember them in My heart; and those that remember Me in a gathering [i.e. that make mention of Me], I remember them [i.e. make mention of them] in a gathering better than theirs.” An effort to expose children at an early age to ‘Halaqah’ (religious gathering and study) is commendable. Without such effort, the children’s future in understanding and learning Al-Quran is uncertain. Our children may stray from the path of virtue and excellence without the guidance of Al-Quran. Researchers have indicated that educational computer games could be an effective way of providing a more interesting learning environment for acquiring knowledge [Cagiltay, 2007; Papastergiou, 2009; Tüzün, Yılmaz-Soylu, Karakus, Inal, & Kazikaya, 2009]. Several studies have reported that educational computer games could enhance students’ learning interest and motivation [Burguillo, 2010; Dickey, 2011; Harris & Reid, 2005; Liu & Chu, 2010]. It was further indicated by Hwang, Sung, Hung, Yang, and Huang (2012), that well-designed educational computer games might have great potential for improving the learning achievements of students. Children need to be occupied with ‘entertainment’ that not only fulfill the academic needs but moral aspect as well. Otherwise, there is a tendency for these children to be exposed to undesirable and negative activities and influence. ‘Collaborative’ learning environment has been a popular choice amongst teenagers nowadays. Learning through playing ‘for’ or ‘against’ each other seems to attract them tremendously. Collaborative ‘game based learning’ (GBL) involves more than one player in gameplay with the pedagogical intention to promote cooperative learning between those engaged in the game. Following Dickey (2007), collaborative games play an important role as engaging learning environments.

Background of the Product
Pahlawan Qarin aims to promote a ‘collaborative learning’ environment for Al Quran education which focuses on teenagers from age 11-15 years old. This age range was selected based on the understanding that Muslim children around this age, mostly has completed their Al Quran recitation studies. The issue that has been brought to concern was that these children may have completed their recitation obligation, but most of them have not immerse themselves into the understanding of the meaning of the verses as well as the usage of those verses in daily lives. Current Al Quran based games focuses on educating users on how to recite the verses with the correct ‘tajweed’, and displaying the translation of the verses such as Quran Puzzle published by Mizan Apps Publisher, Muslim Kids Quran published by Osratouna.com and Marbel ‘Mari Belajar’ Mengaji published by Educa Studio. These games lack (i) collaborative element (multiplayer feature) and (ii) adventurous game playing concept. As learning Al Quran for
Muslim is a must, the conventional approaches have always been the common way chosen by parents and teachers, which is by using printed paper based or ‘hardcopy’.

**Methodology**

The study was conducted amongst standard 6 (12 years old) students from a public primary school in Pagoh, Johor, Malaysia. Sekolah Kebangsaan Kampong Raja which is situated in the rural district of Johor was selected for this purpose. Fourteen students and one Islamic subject teacher participated in this study. *Pahlawan Qarin* was developed based on the concept of ‘multiplayer’ game (using internet connection) that incorporates learning section (Al Quran recitation and translation) and after that, quiz or test section in the form of adventure playing. The story line of the game revolves around the player who is called ‘Pahlawan’ (user/player themselves) that will receive bad/evil seditions from a ‘being’ called ‘Qarin Djin’. Throughout the game (3 levels), the player will have to fight those seditions by finding the correct paper (containing the name of Al Quran verse and line number). All players have to destroy the ‘Qarin’ by colliding with the paper, which symbolizes the action of the player reciting those verses. Although this game actually has a wide specification to be fulfilled, due to time constraint, the implemented product is considered as the first version (basic version).

Based on the designed storyboard as well as the concept of ‘multiplayer’ game that we intended to incorporate, we had identified the technology and tools needed. For the game development, we mainly used Unity (version 2019) which is known as a cross-platform three-dimensional (3D), two-dimensional (2D), virtual reality (VR), and augmented reality games (AR) game engine developed by Unity Technologies. Photon Unity Networking (PUN) was used to accommodate the need for ‘multiplayer’ feature. PUN is a Unity package for multiplayer games which is known for its ‘flexible matchmaking’, meaning that it can get your players into rooms where objects can be synced over the network. Figure 1 shows the design of *Pahlawan Qarin* starting with the Main Menu, Login or Player’s Registration, Al Quran Recitation section, Game Play Level 1, Result After Game Play and Game Play Level 2.

**Results and Discussion**

Data collection was conducted using Google Form on the same day that the game was implemented which was on 21st May 2019, situated in the computer room of SK Kampong Raja. Two sets of questionnaire (pre-usage and post-usage) were presented to each of the students and teacher to gathered responses on the level of interest and engagement of students in learning Al Quran using digital multiplayer game, *Pahlawan Qarin*. Discussions were made with the teacher beforehand, regarding criteria to measure ‘student’s interest’ aspect. Based on the agreement made, we decided that these criteria will be used: (i) body language, (ii) facial expression, (iii) enthusiasm shown and
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(iv) level of participation. Table 1 proved that ‘collaborative’ learning game indeed has a big impact towards students. The average increase of interest defined by the students themselves was as much as 20%, while teacher agreed that an average increment of 15% was spotted in the implementation session. Other elements that were measured as displayed in Table 3 (student’s feedback) are (i) usability of the product particularly in teaching and learning Al Quran, (ii) attractiveness of the product (user interface, color and graphic aspect, animation, visual design) (iii) user friendly feature, (iv) preference in ‘multiplayer’ feature and (v) originality of the product.

Most of the questions asked in the questionnaire require an Agreement answer based on values 1= Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree). Overall, the responses received were mostly positive which include value 3 and 4. Ultimately, the students enjoyed the ‘multiplayer’ game by expressing their enthusiasm throughout the entire playing session. They also informed that this is the first time they had encountered an Islamic ‘Djin’ concept game which highlights the usage of Al Quran verses. Not only that Pahlawan Qarin exposes these students to a ‘being’ called ‘Qarin’ but also the importance of knowing Al Quran translation as well as showing them how and when to apply those verses according to certain situations.

Table 1: Level of interest in Al Quran teaching & learning session.

<table>
<thead>
<tr>
<th>Samples</th>
<th>(1) Teacher Observation on students</th>
<th>(14) Students Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average %</td>
<td>Before using CLG: 75</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>After using CLG: 90</td>
<td>88</td>
</tr>
<tr>
<td>Increment (%)</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

Importance to Education
1. Cultivating Al Quran reading, recitation and comprehension culture amongst teenagers.
2. Educating users on the usages of Al Quran verses in daily lives through Qarin Djin ‘being’.
3. Assisting tool for teachers in Al Quran recitation and education topic in Islamic Studies subject. As well as assisting tool for parents at home.

Advantages of the Innovation
1. Promote a ‘non-violent’ game that cultivate total reliance in Allah SWT (The Almighty’s words/verses) to overcome negative situations in live.
2. Teenagers may spend their time learning Al Quran along with their friends in a fun way.

Commercialization Aspect
Copyright for Pahlawan Qarin has been applied from MyIPO, Malaysia. As this is a desktop game, it can be downloaded from a website (pay per download), installed and be played with internet connection. As this product language is in Malay Language, it can be marketed to Malay speaking countries such as Malaysia, Singapore, Indonesia and Brunei. However, the development in English Language will soon be done named ‘Qarin Warrior’ so that it can be reached by more Muslim children around the world.

Acknowledgements
This study was conducted based on the product Pahlawan Qarin game developed for IT Diploma Project Semester I Session 2018/2019 with the collaboration of Sekolah Kebangsaan Kampong Raja, Pagoh, Johor.

References


HEROPRENEURSHIP ON MOOC AND E-CAMPUS AT UNIVERSITI MALAYSIA KELANTAN

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Highlights: Creating “Heropreneurs” in this course has a unique learning approach where the students are taught on the value of social impact. Heropreneurs are required to take workable value creation models and use the theories learnt in the course. Next, they need to transfer the theory into the practice by generating ideas to form social enterprise. The practical aspect of learning using powerful tool to plan meetings, virtual discussions and collaborate both virtually and physically was conducted. Some 179 students with 1,064 comments were captured from those who participated in MOOC OpenLearning.com platform; and another 94 students who used Facebook closed group. The team-based and “the build to think” co-creation model combining the Design Kit of IDEO; and the Social Enterprise Test based on a Malaysian perspective are used where the students are required to work on the social impact projects featuring on how social entrepreneurs make their entities more self-dependent. The immersive learning requires a methodology of a cohesive process of creativity, risk taking and planning. The course is conducted systematically and offers transferability and scalability.

Keywords: social entrepreneurship, e-learning, heropreneurship, blended learning, design thinking.
STEMPRENEUR IN ROBOTICS AND COMPUTATIONAL THINKING

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Highlights: A number of STEM educators were found not being trained extensively to deliver STEM education into a high-end solutions and knowledge to students in school. Furthermore, students and teachers in Malaysia are heavily dependent on foreign educational software tool for STEM education. To enhance STEM education in schools, STEMpreneurs are being groomed to enhance robotic education, and computational thinking. CORE is a self-funded, proudly Malaysian home-grown innovation that offers a Pick-n-Place Flowchart block based on the interactive visual software tool. The visual software tool offers activities for developing programming algorithm, testing, data collection, processing, visualization with IOT/IIOT (Industrial Internet of Things) capabilities. The blocks are designed in an appropriate flow and logic blending with mathematics, text, timers, media and IOT functions. CORE works either by using built in on-screen model or physical model. The model can be connected to a plug-n-play microcontroller board like Arduino Uno via the PC’s USB communication ports. The innovation offers its own uniqueness and values as it is also engaging OKU learners (students with disabilities) and turns them into STEMpreneurs. The OKU will later be groomed and engaged into income generating activities to deliver STEM education and learning to a wider market. Malaysia will benefit sufficient number of qualified OKU STEMpreneurs in meeting the Industry 4.0 talent to grow. The innovation fits the startup and Green SME promotion agenda in Malaysia.

Keywords: Stempreneur, Robotics education, STEM, Computational thinking IOT.
GAMIFIKASI GLOBAL HALAL GAME (GHG) DALAM E-PEMBELAJARAN

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Highlights: Inovasi gamifikasi Global Halal Game (GHG) telah diperkenalkan untuk menjadi bahan bantu mengajar kepada guru dan pelajar dalam proses pengajaran dan pembelajaran termasuk secara atas talian. Objektif GHG dibangunkan adalah untuk meningkatkan kesedaran dan kefahaman masyarakat terhadap kepentingan ilmu halal serta meningkatkan kemahiran guru dan pelajar melalui medium e-pembelajaran yang interaktif. GHG dibangunkan berdasarkan sukatan pendidikan Islam sekolah dan Manual Prosedur Pensijilan Halal Malaysia yang juga sesuai dijadikan kaedah latihan kepada agensi berkaitan untuk mempelajari prosedur pensijilan halal secara menyeluruh. GHG diyakini mampu menjadi platform bahan bantu mengajar yang terkini berkonsepkan e-pembelajaran, interaktif dan efektif.

Keywords: Gamifikasi, e-pembelajaran, Global Halal Game (GHG)

Introduction

Acknowledgement
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References
TEACHING COMPLEX MATHEMATICS OPERATION USING AUGMENTED REALITY

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Highlights: The aim of this innovation is to provide an engaging, meaningful and technological way in real-time environment for the teachers to teach complex mathematics operation through mobile application with the aid of augmented reality (AR) technology. This application can help teachers to give real-life examples when explaining the mathematics concepts. Equation can be selected from the list of the equations available and use the camera to scan a real 3D object. The AR activity of the scanned object will be triggered and answer(s) will be produced based on the equation, scanned object and the value of dimensions that entered by the teachers. A visualisation of the result will also be displayed after applying the selected equation.

Keywords: Augmented reality, mobile application, teaching mathematics.

Introduction
Mathematics is a compulsory subject for every student in primary, secondary and pre-university program. Learning mathematics is very important in our lives because it can nurture our power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem solving ability and even effective communication skills [1]. However, most of the students found that mathematics class is very boring and stressful. Some students even have math phobia as they move on to the higher class. This is because the teachers do not implement the right way to teach mathematics concepts to students. Rather than being taught in a way that is applicable to real-life situations and more engaging for students, mathematics is taught as strictly paper-and-pencils subject with no dimensions whatsoever. Most of the teachers prefer the students to memorize the formula or equation and give them a lot of homework so that they can remember the solving steps and score well in the exam. Therefore, the students cannot get the importance and practical application of the math concepts especially the complex mathematics operations and they are forced to learn and master if, so they could start to dislike mathematics.

Augmented Reality is a technology that takes the world around you and adds virtual content on top such that it looks like it is there in the real world [2]. The complex mathematics operations that are involved in this project are first order differentiation and second order differentiation. This application can help the teachers to give real-life examples to their students when they are explaining the mathematics concepts. Teachers can select one equation from the list of the equations available and use the camera to scan a real 3D object from their surrounding environment. The AR activity of the scanned object will be triggered. An answer will also be generated based on selected equation, scanned object and the value of dimensions that entered by the teachers. A visualization of the result will also be displayed after applying the selected equation.

Proposed Solution
An Augmented Reality (AR) app is proposed to solve the problem. The user can select one equation from the list of equations. Then, the user can use the camera to scan the real 3D object. A brief visualization of the equation on the scanned object with explanation will be displayed using AR. The app will calculate the answer according to the object, selected equation and the value of dimensions that entered by teachers. A detailed visualization of the objects with explanation will be displayed after calculation is performed.

The application is divided into three modules:

Object detection module
This module basically responsible for detecting and tracking the 3D objects using the camera. Vuforia SDK[6] will be implemented in this application for the object detection and tracking. The 3D object must be opaque, rigid and contain few moving parts for the object detection to work well. Pliable or deformable objects are not supported. Only 1 object target can be tracked simultaneously in Vuforia. Besides, the object should be viewed under moderately bright and diffuse lighting. To the extent possible, the surfaces of the object should be evenly lit and do not contain shadow caused by other objects and people. When the target is in the field of view of the camera, the AR activity will be triggered. For the object detection to perform well, the 3D object should be in static position.

Calculation of equation module
The user can select one equation from the list to perform calculation. An answer will be displayed after performing calculation based on the selected equation, scanned object and the value of dimensions entered by teachers.
The list of equations that are involved in this project are shown as below:

a) First Order Differentiation Equation
\[ y' + P(x)y = Q(x) \]

b) Second Order Differential Equation
\[ y'' + p(t) y' + q(t) y = g(t). \]

**Result visualisation after applying equation module**

This module is responsible for visualising the result after applying the selected equation to the scanned object. The result will be visualised either in 2D or 3D. A brief visualisation of result with explanation will be displayed using AR once the object is tracked and detected by the application. A detailed explanation of result will be displayed after the calculation.

**Background of the Innovation:**

The current existing applications that teaching mathematics using AR are relying on 2D flashcards to activate the augmented reality activity. Some applications for example Aug That! requires specific target images to use the applications. Therefore, the applications cannot be used anymore if the flashcards/ target images are lost or damaged. Besides, the current applications also do not allow the teachers to utilise the surrounding 3D objects to make the class become more interactive as the information is not available in the database. They also mostly are focusing on teaching simple mathematics concepts to early learners instead of high school students. Besides, most of the calculus learning app is also focusing on providing the explanation in text form without any animation and audio. So, it makes the students feel boring and not interested in using the app for their learning.

Mathematics is very important subject for all students throughout their study lives. It develops their reasoning and analytical thinking and quickens their minds. However, majority of students always think that math is boring, lack of creativity and very difficult to understand especially complex mathematics operations. Hence, they start to hate math when they move on to the higher class since the math concepts become more complex. By having this application, the class will become more interactive and increase students’ understanding on how complex mathematics can be applied on. Besides, teachers also face a lot of difficulties in teaching mathematics because they do not have an interactive medium to explain the concepts and get attention from the students. Therefore, the teachers also will be demotivated and lose their passion in teaching.

The objectives of the system are:
1. To apply object detection and do model target for augmented reality application
2. To develop an interactive application for Mathematics teaching and learning with augmented reality technology
3. To demonstrate the 3-Dimensional visualisation of real objects from selected Mathematics equations

**Benefits and Uniqueness of the Proposed Solution:**

This project able to transform the teaching through latest technology. A 3D visualisation with dimensions displayed and brief explanation by augmented reality can be produced based on the selected equation and object captured by the camera. Therefore, students will have deeper understanding on the mathematics concepts through the demonstration of real-life examples. The uniqueness of this project is the teachers can scan a 3D real-life examples instead of scanning a 2D flashcard. They can make full use of surrounding environments to give examples to their students for example magic cube, ball and others. Besides, the result will also be visualised in either 2D or 3D after applying the equation on the scanned object.

**Advantages of the Innovation towards Education and Community:**

1. This application allows teachers to teach mathematics in a more interesting and interactive way.
2. This application allows teachers to utilize 3D objects to give real life examples on the mathematics concepts to their students.
3. Can be introduced as a common teaching assistant tool in teaching mathematics subject to all high schools.

**Commercial Value:**

It can be offered as downloadable program in application store such as Google Play Store.

**References**


EDUCATION INSTITUTION INTERNET OF THINGS (IOT) ONLINE DASHBOARD FOR ACADEMIC DATA SHARING

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Highlights: Various Internet of Things (IoT) devices are currently being developed by academicians and students wise for various type of research. However, platform for sharing the results and data in form of visualisations and raw data is limited, while some involve commercial elements which restricts the freedom as academicians. This project proposes an Education Institution IoT Online Dashboard for academic data sharing. Academicians and students have the freedom to share the results of their research using the dashboard, thus increasing public exposure for their academic projects.

Keywords: Internet of Things, Online Dashboard, Big Data

Introduction
Internet of Things (IoT) has become a niche area within many disciplines of research. As a method of efficient real-time data gathering, IoT devices have been developed and implemented for the purpose of surveillance, analysis, maintenance and education. However, current trends of IoT devices restrict the users to individuals who are deploying such device, limiting access to information by other parties, while others involve commercial elements. Current trend in multidisciplinary research involves academicians and students to dive into information that diverse from their main discipline. For example, agriculture researchers and students might require data obtained through sensors developed by engineering researchers. However, not every researcher has access to such a big network of academicians to obtain such data, while some might not be as reliable due to questionable sources.

This research intends to provide a platform for sharing research data, with reliable sources, which is the education institution itself, towards public inform of visualisation and data bank dashboard. The Education Institution Internet of Things (IoT) Online Dashboard will provide data sharing, in form of visualisation and data, while providing public feedback to the source researchers themselves. Through this dashboard, researchers and students may increase public exposure for their projects, encouraging access to multidisciplinary research to indulge in. Data can be monitored and downloaded through this dashboard, providing real-time credible data supplied by credible source within the education institution itself.

Design

The dashboard supplies information of research in form of channels. In the developed dashboard, UMP researchers may register to the website with the UMP id. General description of the channel will be described by the researcher himself. The channels will form a list, where public visitors can search the relevant channels for their references. Visitors will be able to vote for likes and favourites to describe how important the data provided impact their activities. Through this voting method, the source UMP researchers will understand the significant of the data provided to the public.

Once the visitor accesses the channel, the visitors may observe any graph visualised by the researcher. The researcher needs to include the API key provided by the dashboard system inside the IoT device as publish target. Once the connection has been established, the data will be transmitted to the dashboard and displayed according
to the graphs generated based on the researcher settings. Through this dashboard, the visitors may copy the figures and they are allowed to download the raw data provided by the researcher.

**A WAY TO FUTURE: DISCOVER AND LEARN WITH MOBILE AUGMENTED REALITY (AR)**

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**Highlights:** Have you ever wondered in bringing Tyrannosaurus into your classroom? Is it possible? Yes, with mobile augmented reality it is very possible to combine the real and virtual world by only using handheld devices such as tablets and smartphones. In this study, an AR application was developed based on the elements of the self-recorded video in order to promote students’ learning. The learning application was designed using the HP Reveal platform which is a free application available for iOS and Android devices that allow users to create an Aura (3D overlays). HP Reveal platform also supports multimedia elements such as video and images that will be triggered based on an image.

**Keywords:** augmented reality, educational technology, higher education innovative pedagogy, HP Reveal, collaboration

**Learning Facts and Concept: The challenges**

There are many empirically evident from the past studies that traditional teaching technique such as memorisation and recitation yield positive result in students learning. Even though there are successful results from these methods, students are still facing challenges of acquiring skills and knowledge for deep learning, apply problem-solving and work collaboratively as a team to achieve common goals. The situation seems to be more critical and oblivious among the first semester undergraduate students who are having a hard time grasping declarative knowledge such as facts, concepts and apply it to a solve real-world problem. Thus, lead to a misconception about the topic learned. Initially, learning declarative knowledge is very important before students will be able to proceed in learning procedural knowledge of learning discrimination, concrete concept, defined concept, rule, and problem-solving (Gagne, 1971). Hence it is very crucial that lecturers recognise a suitable pedagogical approach in order to minimise misconception among the students (Endo, Yasuda, Mouri, Urata, & Tian, 2014). When students are unable to relate to the content taught during the class, they perceive that learning task activities are very boring and not engaging. As a result, students have concentration issues and a lack of motivation towards learning. Therefore, learning a team factual knowledge and concepts can be fun and meaningful through visualisation and modeling that allow the students to explore the combination of real and virtual object through technology such as AR.

**Project Description**

In this study, a learning application in the form of AR was designed using the HP Reveal platform. HP Reveal platform is a free application that is available for iOS and Android devices that allow users to create an Aura (3D overlays). This platform also supports multimedia elements such as video and images that will be triggered based on a real object. The AR application designed are mainly for learning factual and concept of the topic “Cybercrime”. First, a content focus on “Cybercrime” based on AR video was created using the free version of the HP Reveal platform. After registering for an account, the real object is uploaded. The real object used in this study is two infographic posters based on “Cybercrime”. The account was set to be “public” to allow the students to “follow” to access the AR created. Figure 1 shows the procedure of creating the AR application with HP reveal.

![Figure 1: Summary of procedure in creating AR application with HP Reveal](image)

**Background**

The “Cybercrime” AR application was implemented to facilitate learning facts and concepts among undergraduate students. The context is the undergraduate course in the Faculty of Education at a public university. The course participants were enrolled in a Bachelor of Counselling Programme Semester 1, Year 1. The rationale behind selecting
the undergraduate course is because of their digital native and familiarity with digital technology from a young age. However, digital technology familiarity is mainly for socialisation and entertainment with less usage for learning purposes. Hence, forty students participated to experience learning via AR based on voluntary bases.

AR application is very important in education from the context of learning the topic “Cybercrime”. Teaching and learning in higher education should focus more on acquiring skills for interacting, applying, evaluating and creating new knowledge as well as problem-solving (Martin, 2006; Ronen & Pasher, 2011) rather than just the transmission of knowledge (Dewitt, Alias, & Siraj, 2015). Hence, higher education institutions are moving away from didactic and traditional pedagogies towards learning new knowledge and skills in an interactive way. This is because AR technologies have the potential to engage and motivate students to explore learning in a fun way rather than listening to a lecture (Baloch, Qadeer, & Memon, 2018; Majid, Mohammed, & Sulaiman, 2015). AR technology creates learning to be more effective and interesting since AR trigger student’s creativity and curiosity while learning (Kesim & Ozarslan, 2012). Learning via AR has the benefit of developing students thinking skills and problem solving. While working on AR, students also learn collaborative skills to work as a team on certain task either face-to-face or remotely through the merging of the virtual world and the real world (Kesim & Ozarslan, 2012; Wang, Callaghan, Bernhardt, White, & Peña-Rios, 2018).

Advantages
AR application developed for the topic “Cybercrime” has many advantages for the students, lecturers and greater impact to a larger audience. From the student’s perspective, there were several advantages in using the AR application, namely, it is a user-friendly tool for learning; engaging students, enhance learning motivation and promote collaboration. Based on the pilot results, students were satisfied by learning with AR since the application is effective and efficient in learning factual knowledge and concepts in an engaging and interactive way. AR also promotes collaborative learning among peers by allowing them to work together by applying, creating new knowledge and problem-solving. Since collaborative skills are among one of the vital skills students needed to have before entering the marketplace, AR application created the opportunity for the students to experience and learn while at the University.

From the lecturers’ point of view, by creating own lesson/topic via AR creates the culture of innovation in the use of emerging technologies rather than using direct-instruction for the teaching and learning process. Through AR application, lecturers are able to design more engaging and interactive learning task which will encourage students to learn factual knowledge and concepts in a fun way through visualisation rather than memorising and recitation techniques. In addition, AR also serves as an on-going feedback and assessment where lecturers can instantly provide students with real-time comments and responses on their task and progress.

From the greater audience perspective, AR can be applied in many disciplines such as Engineering, medical, computer science as well as in social sciences from the aspect of training and teaching. The AR platform also offers educators with readily available activities if self-designing one will be time-consuming. Besides, instructional designer, as well as module developer, can work along with educators to design learning activities with AR based on content the educators are teaching. The most important aspect of AR application is convenient, portable and inexpensive to use, the users only need to have handheld devices such as tablets and smartphones to download the AR application.

Commercial Potential
At the moment the AR application for the topic “Cybercrime” is freely available for all users because HP Reveal platform itself offers a free application for the users. The aim of the product is not for commercial, it solely for education purposes.

References
LINPROT: AN INNOVATIVE COURSEWARE WITH INTEGRATION OF AUGMENTED REALITY FOR OPTIMISATION METHODS

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Highlights: What is special about LinProT? LinProT is an educational courseware for Optimisation Methods. LinProT consists multimedia elements package; short video tutorials and scanned pictures by using QR Code and Augmented Reality (AR) application which is HP Reveal. There are three types of modules related to Optimisation Methods that contain in LinProT, which are notes, exercises and tutorial videos. Users can enjoy new experience of learning through courseware involving AR application and reduce frustration in learning through boring reading.

Keywords: Optimization Methods, Courseware, Feasibility, Augmented Reality, Education, ADDIE.

Introduction
During the 4th Industrial Revolution, students were not only expected to be wise in obtaining information to support the development of the existing knowledge of the instructors, but they were expected to have the wisdom to optimise their knowledge as well. Ministry of Higher Education has introduced the Higher Education 4.0 (MyHE 4.0) theme which includes the Teaching and Learning 4.0 process in the universities that emphasise the latest technology utilisation. According to the minister, Datuk Seri Idris Jusoh, learning methods such as heutagogy (self-determining learning), paragogy (cyber-oriented learning) and cybercogy (virtual-based learning) need to be adjusted in this teaching and learning 4.0 (T&L 4.0) (Nor Azma Laila, 2018). In addition, the introduction of 21st century learning method in T&L process helps the students to have a better understanding about the concepts of learning as well as improving their interest to learn. This method focuses on three major components which are knowledge in technology, pedagogy, and lastly the content and curriculum (Nik Nor Ahmarizam Nik Ahmad, 2015).

Background
Besides, the role of instructors in implicating the learning approach that use technology in T&L process is very important. Based on this learning approach, computer is one of the technological equipments used, as a computer assisted learning approach. According to Noreliana Md Shariff (2012), the effective application of courseware in T&L, specifically to produce interactive learning materials motivates students to continue exploring the content of learning in addition enriching the existing learning approach. Siti Maisarah Ahmad (2013) also stated that software in courseware form is one of the forms of educational software that focuses on a specific learning that contains instructions. The use of computer software in Operational Research which includes the OM can improve students’ understanding of the form of mathematical methods in the OM quickly and easily (Maslin Masrom et al., 2010). Thus, researcher decided to develop an innovative educational courseware in Optimisation Methods (OM) course, named LinProT as a learning tool for students and lecturers. The objectives in developing LinProT are producing courseware containing self-direct learning elements that are integrated to help the needs of students and evaluate the feasibility of LinProT in terms of relevance of content, achievement of lesson objectives, ability to attract users and its feasibility in T&L. There are three types of modules that fulfill the curriculum and course learning objectives in OM course contain in LinProT, which are notes, exercises and tutorial videos. It also consists multimedia elements package; short video tutorials, scanned pictures by using AR and connection to other calculation software packages.

Methodology
An instructional design model named ADDIE model would guide LinProT’s development. According to Mohd Ali Ibrahim and Ahmad Solhi Redwan (2010), the choice of model systematic instructional design is very important as it will be the framework for developers or designers to develop multimedia software systematically. Therefore, ADDIE model is appropriate in this development because it is one of the models of teaching design or systematic design in the production of effective and user-friendly learning tool (Baharudin Aris, Rio Sumarni Sharifuddin, & Subramaniam, 2004). Based on the study conducted by Johari Surfi, Nor Hasniza Ibrahim, and Mohamad Yusof Arshad (2006), Farah, Hanani, Zuraida, and A (2019) show that the software and courseware developed using ADDIE model had a great impact as an additional learning tool. In general, ADDIE model has five main phases in designing courseware, which are analysis, design, development, implementation and evaluation.

In Analysis phase, a preliminary study of the need to identify the elements required by the students and instructors in the design of the courseware. In addition, the aspects of the development of the courseware need to be considered in terms of target groups, learning topics, objectives and learning outcomes, consumer needs and T&L methods.
Findings of this requirement analysis study will be the main guide in designing of the learning courseware. The instrument involves in analysis phase is questionnaire about study of the needs of users for students in OM course.

**Design phase** of the courseware refers to several important aspects of the learning theory that involves the design of notes learning modules, exercises module and tutorial videos module on the use of the courseware. Before researcher made notes and exercises modules for the LinProT courseware, researcher has observed and analysed the instructional plan for OM course from the Faculty of Science and Mathematics in Universiti Pendidikan Sultan Idris (UPSI).

**At development phase**, some aspects and guidelines are required to develop the courseware which include hardware and software requirements. The use of multimedia technology elements is important for the development of the LinProT courseware. The main software used to develop LinProT is Macromedia Director.

**Implementation phase** tests the generated courseware to users. The researcher conducts a pilot study to identify the level of feasibility or the realisation of the actual study to be conducted as well as to increase the validity of the study instrument. Additionally, the researcher introduces this courseware to some of the faculty lecturers who have experienced teaching in the OM course and experts in education and development courseware to identify the problems faced or exist.

**Evaluation phase** involves the process of using the courseware in T&L and assessing the feasibility of this courseware which involves questionnaires of feasibility assessment courseware for students and lecturers separately. Based on analysis of data obtained using SPSS 20.0, the development and feasibility of LinProT in the OM course meets the requirement of users especially Diploma in Mathematical Science’s students UPSI.

The advantages and disadvantages in LinProT

There are many advantages of using LinProT courseware in T&L process as students can learn by themselves as it is user-friendly because it can be installed on the computer and accessible anywhere offline. The courseware covers the entire topics in the OM course. Students can have self-learning courseware because it can be installed and access offline due to the stand alone system and can be used to offer course in an independent study base. For instructors, it will improve their lecture. It makes the classroom lectures more informative and exciting by enhancing students’ participation in classroom discussions. The intent is to have a more active learning environment rather than a passive one. This courseware consists of multimedia elements package: short video tutorials, scanned pictures by using HP Reveal application and Quick Response (QR) Code and connection to other calculation software packages, it will produce dynamic learning atmosphere. But, it has a limited time use because it is only suitable for the OM course for UPSI students as long as the faculty and administration do not make any changes to the learning plan for this course. However, other students may also use this courseware as a reference in the Operational Research course as long as it still covers the same aspects. LinProT is only useful if the faculty and the administration do not change the Instructional Plan of OM Course for UPSI students.

**Conclusion**

Hence, the positive findings from this study are seen to enable the students enhance their unique learning needs and learning process by utilising the latest technology. It is hoped that the adoption of AR technology in LinProT will not only add to new technology in education but it will complement and improve what is already being used in Malaysian education especially in Mathematics. Besides, LinProT has been said to be the next best thing and will be the future
of the education industry. It encourages the students to be immersed with this courseware in OM course. It is also potentially to be marketed to institution, college and university students as learning tool.

Acknowledgement
The authors would like to thank the Sultan Idris Education University under the university teaching and learning research grant (2018-0180-107-01) for financial support.

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INSPIRING LEGAL INNOVATIONS INTEREST AMONGST LAW STUDENTS THROUGH GAMIFICATION IN SUSTAINING FUTURES FOR LAWYERS

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Highlights: As of 2019, there are 22681 lawyers and 7923 law firms in Malaysia but only 28 legal technology firms that are actively making use of advanced artificial intelligence (AI) platforms in legal work. In the era of Fourth Industrial Revolution, there are various legal works that are becoming automated and hence it is not sufficient for law students to only know the law. Law students must be equipped with skills that can future-proof their careers from automation. As a result, an innovative teaching project was introduced for LAW 64404 Legal Skills and Methods module which explores the use of gamification to study law using technologies as well as developing their soft skills in order to survive alongside artificial intelligence. Whilst reading legal materials is important to the students, it does not necessarily bring a deep personal experience for students in relation to legal innovations. The introductions of ‘Legal Writing using Toothpaste’, ‘Poker-ing your Ideas’, ‘Speed-Dating the Law’, ‘Advocating via AR’, ‘Presenting using NLP,’ ‘Problem-Based Learning’ are some examples of gamified teaching techniques that encourage law students to approach law beyond the conventional methods. The results of qualitative survey have shown that students whom were not previously aware of AI in the legal workplace and automation has become more inspired to pursue interests in legal innovations. The results of gamification in learning law would have the effect of sustaining future careers for lawyers.

Keywords: Law, Gamification, Sustaining Futures, Legal Innovations, Automation

Introduction

In 2018, World Economic Forum has produced a report that lawyers are amongst list of professions that will be made redundant in the future (World Economic Forum, 2018). Hence the gamification-based learning for Legal Skills and Methods module was adopted in March 2018, August 2019 and March 2019 semesters in order to ensure that students are equipped with future skills to work alongside artificial intelligence. The gamification in learning law does not only focus on core skills for future graduates, but also embed ‘Neuro-Linguistic Programming’ skills. The gamification-based learning was developed so that law students can utilise skills that are not available in artificial intelligence programmes such as empathy, communication, critical thinking, creativity, strategy, technological innovations, physical skills, imagination and vision (Marr, 2018). The gamification design for learning Legal Skills and Methods is as per below image:

![Gamification design and methods image](image-url)

In August 2018, the Malaysian Bar organised International Malaysia Law Conference raising awareness on innovations that can impact the legal community. During the conference, many practicing lawyers raised concerns about the effect of artificial intelligence for the future legal employment. During the Conference, there are many lawyers who are resisting the use of technology in the legal industry but there are also lawyers who are exploring on how technology
can be beneficial for their law firms. From this Conference, it is apparent that legal technology is rapidly developing globally and the use of artificial intelligence in law firms is slowly gaining its recognition. The concerns raised by the lawyers were the drive in the changes of the teaching pedagogies for Legal Skills and Methods module. In addition to incorporating technologies in learning the law, the students are exposed to various gamification in learning law which includes the use of Augmented Reality and Neuro-Linguistic Programming. These elements place a human touch on the use of such technology as the correlation between AI, AR and NLP has the ability to develop students’ core skills (Taylor’s University, 2017) and also future-needed skills such as empathy, communication, critical thinking, creativity, strategy, technological innovations, physical skills, imagination and vision (Marr, 2018).

Importance to Education

There is no one size that fits all students’ learning styles particularly when there are many types of students in a classroom (Sarah Kass, 2011). However, gamification-based learning can widen students’ horizon in learning law as they are expected to engage in various innovations in learning law. The activities introduced in lecture and tutorial sessions such as Legal Writing using Toothpaste’, ‘Poker-ing your Ideas’, ‘Speed-Dating the Law’, ‘Advocating via AR’, ‘Presenting using NLP’ and ‘Problem-Based Learning’ would inspire the students to be engaged in innovations. These activities would increase students’ learning experience making them to be more confident to advocate the law to the members of the public. Students will be receptive in making use of artificial intelligence platforms to advocate the law and at the same time, they will practice using their eye contact, voice intonation, body language and enthusiasm level when approaching members of the public. These students will be able to assess their personal development from a college student to Year 1 university student. The self-actualisation plays an important role in students’ growth (Shiv Tripathi, 2012) as the gamification in learning law allows the students to appreciate social closeness and feelings of empathy which technology cannot teach the students.

Advantages

Gamification in learning law provides a landscape for students to challenge themselves in providing better access to justice for the community. Apart from the students being continuously inspired in their learning, they would be able to embrace and integrate various innovations to sustain the future of the legal profession from being completely automated by artificial intelligence. Gamification in learning law prepares the students to face the various changes in the technology that may affect the legal industry. The interests that the students have developed in Legal Skills and Methods class will make their pursuit of justice to be more effective, meaningful and impactful to the society.

Commercial Potentials

Gamification in learning law is not a mere engagement tool or a gimmick to get the students interested in studying law but it encourages students to explore, experience and innovate (Lawrie, 2017). The combination of knowledge on artificial intelligence, gamification, Augmented Reality and Neuro-Linguistic Programming increases students’ level of confidence to provide advocacy to the members of the public and also to be more involved in legal innovations. The gamification-based learning methods are not limited to legal discipline but it can be developed for other disciplines which will also be affected by artificial intelligence. With sufficient funding, the gamification-based techniques can be marketed and turned into a mobile application for school teachers and university lecturers.

Acknowledgements

I am blessed to be working in an institution which is very supportive towards academicians introducing various out-of-ordinary teaching innovations to students. I am also thankful to all of my law students who are receptive towards my teaching pedagogy for LAW 64404 Legal Skills and Methods module. I would also like to express my appreciation to the Head of School (Mr Harmanhinder Singh), my colleagues, faculty office staff, e-LA team, family and friends for always inspiring me to give my best every day.

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CREDENTIALISE LEARNING FOR LABORATORY SAFETY INDUCTION COURSE AT HIGHER EDUCATION USING BLOCK CHAIN TECHNOLOGY

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Highlights: Safety induction for students in universities is a necessity as they are directly exposed to various hazards. An innovative method of delivering the laboratory safety induction course using one hundred percent online method, in a self-directed manner was conceived. Using this method, learning at scale is a possibility while saving time and cost. The online delivery was thought of as a solution to mitigate the issue of repetitive induction sessions at different times in a year. Incorporation of interactive videos and online assessment creates an opportunity for in-depth learning, on the various aspects of laboratory safety, increases of awareness, and precautions to be taken by students. This mode of study enables international students who may be held back due to visa processing to get onboard into the induction course. At the end of the induction, a digital badge (e-badge), backed by block chain technology, Accredible will be issued to students. The Accredible e-badge system, adopted alongside Open Learning as its learning platform, unfolds new opportunities for practical application towards establishing safety awareness and safety culture among students at the institutions of higher education.

Keywords: block chain technology; digital badge; learning at scale; laboratory safety induction; hazards

Introduction

Institutions of higher education provide experiential scientific learning through laboratory practice. Laboratory safety is important for students who are involved in scientific field as it may impose hazard towards the laboratory users. Students, both in undergraduate and postgraduate, are exposed to different types of hazards which occurred directly or indirectly while in presence at laboratory environment. Tragic chemistry fire accidents that happened in year 2008 in University of California immediately challenged the necessities of safety training prior to the laboratory usage. After its extensive investigation, safety training becomes an important part in bringing the right attitudes and behaviour while performing laboratory activities (Gibson, Schroder, & Wayne, 2014). In another study, safety training was emphasised as an importance aspect in bringing the confidence in researchers for conducting their experimentation with an improved self-efficacy (Schroder, Huang, Ellis, Gibson, & Wayne, 2016). However, the frequency, documentation and the efficient delivery of the training must be incorporated effectively for successful safety training among our new generation of student.

The introduction of a fully online laboratory safety induction module provides a platform for students to learn at scale. In this platform, students can go through an induction course to learn about laboratory hazards, risks and their mitigation through interactive media. This paper describes the introduction of an online laboratory safety induction modules (See Figure 1, label 1) through credentialing using Accredible, a block chain, e-badging technology while utilizing the OpenLearning platform. Incorporating interactive online videos and assessment creates an opportunity for in-depth learning on various aspects of laboratory safety, increases the awareness about the importance of laboratory safety and precautions to be taken by students, at their own pace. Credentialing students using e-badges is an affordable way to award credential to students and verify their learning by recognising their skills and offer them the opportunity to prove their understanding of the skills or knowledge learned through assessment-based activities (Lim et al, in press).
The pedagogy behind the laboratory induction course is aligned with the Taylor’s University’s Pedagogies under the new Curriculum Framework ensuring learning is personalised and structured in a self-directed manner. With the support from the e-Learning Academy of Taylor’s University, the interactive videos were created by adopting the facilities and supports involved in Taylor’s University and Taylor’s College laboratories specialists. Renamed as the Laboratory Heroes (see Figure 1, labeled 3) for the online course, the specialist, established the video content by considering the best approach to be applied in a university environment. Each of the contents was enacted for the learning via visualisation basis.

The safety videos were categorized as shown in figure 1, labeled (2) and each of the module were incorporated with an assessment to test student learning outcome and their understanding. This assessment consists of questions in multiple choices. The overall contents were integrated into Open Learning platform as an open online course for student easy access at anywhere and anytime. The language used on site is adapting simple communicative English so that the learners feel welcome in the course.

Safety training modules were introduced to new intake of Science students from Faculty of Health and Medical Sciences, School of Engineering in Taylor’s University and Pre-University courses in Taylor’s College. Students may access the Open Learning module via the link provided either through website access or mobile access. With assigned safety module, student will be guided through video and assessment at each of the sub-module. Upon completion of the whole course, a digital badge from Accredible, produced from the block chain technology will be issued individually to students. The e-badge served as the key for the lab usage in the campus. Students will be denied from accessing laboratory without proving an evidence of the e-badge. As the block chain technology carries the individual’s information on its badge, students are unable to plagiarise or miss the induction course prior to their commencement into the lab. Table 1 below show students reporting that the fully online laboratory induction course met the lesson objectives.
Commercialisation
Safety training through online study provides an insight for both students and staff who are involved in institutional laboratories research/practical activities. This platform provides a quick understanding on the laboratory safety and helpful in improving the safety attitude and its culture towards the laboratory activities. Participants have the flexibility to learn the safety training at any location at their own pace. Therefore, a safety induction in the online learning environment can be widely applied in other academic institution in promoting safe work culture.

Acknowledgement
We would like to express our sincere gratitude to Faculty of Health and Medical Sciences, School of Engineering as well as the eLA team from Taylor’s University and Taylor’s College for the great support.

References
SUSTAINABLE LEARNING VIA INSPIRED CONNECTION FOR 21ST CENTURY LEARNERS: SYNCHRONOUS CLASSROOM FOR MPU STUDENTS IN TAYLOR’S UNIVERSITY

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Highlights: Synchronous classroom via YouTube live session is a part of the social learning activity for U1 modules at Taylor’s University under the Participatory Online Course (POC) framework. It is user-friendly as students able to be in the live session with just one click. With weekly basis schedule, students will be connected into a live lecture session with flexible mode. The flexible mode allows students to connect with their lecturers from the chosen place. This innovation is based on Grainne Conole 7Cs learning design with the combination of YouTube and open source software for video recording and live streaming. As this module is conducted fully online, this initiative supports and enhances students’ learning experience by having highly engaging learning activity that was designed based on Grainne Conole 7Cs Learning Design. The learning design includes four major steps namely vision, activities, synthesis and implementation. The synchronous classroom helps students to increase the level of motivation to participate which directly increased students’ involvement in the social learning activity. The live session also improves module instructors to be at presence in online teaching that empowered students’ learning experience. It also allows students and module instructors to construct knowledge through instructional activities during the synchronous sessions. The initiative continued for the upcoming semesters as the feedbacks are positive.

Keywords: Mata Pelajaran Umum, Synchronous Classroom, Online Learning

Introduction and Product Development

U1 Synchronous Classroom Via YouTube Live session is an inspiring innovation of teaching and learning for a sustainable future of students’ learning. This project innovatively designed to bring and maintains the students’ motivation and high-level engagement until they complete the entire course by having a sustainable and inspiring learning environment. As this module is conducted fully online, this initiative supports and enhances students’ learning experience by having highly engaging learning activity that was designed based on Grainne Conole 7Cs Learning Design. There are four steps of developing the modules namely vision, activity, synthesis and implementation.

![Figure 1: Learning Framework for U1 Modules Synchronous Classroom at Taylor’s University (Conole, 2012)](image)

Potential/Importance in Education Field

As the e-learning rapidly grows in Institution of Higher Education, the video-based learning materials is the best method to deliver educational content. However, it does not meet the 21-century learners’ expectation as students still prefer to communicate with their instructors. Therefore, the innovative concept applies to produce Synchronous Classroom session that aligns with the current generation student preferences, which is flexible in learning time and environment. YouTube Live brings the content ‘alive’ via synchronous video thus increase the students’ interaction and participation.
via live chat. This meets the students’ need as they find their personalised learning in the synchronous classroom with instructors and peers.

Moving forward, the innovative strategies in implementing synchronous classroom in an online environment will bring the education industry one step above in the e-learning field and life-long learning. After the synchronous classroom over, the student still able to continue their learning via asynchronous by reviewing the recorded version of the video together with the peers chat interactivity. This creates the learning experiences beyond the traditional classroom as the classroom interaction not recorded for future learning.

![Image](https://youtu.be/DkDYjGQLcso)

**Figure 2:** The recorded Hubungan Ethnik Synchronous Classroom Link: [https://youtu.be/DkDYjGQLcso](https://youtu.be/DkDYjGQLcso)

**Advantages**

The advantages of the Synchronous classroom via YouTube live session are:

- It gives the live interactive experience. During Synchronous classroom via YouTube live session, students are able to have a live interactive experience. This live interaction is really important as it substitute face-to-face classroom. Students also able to see their lecturers and get instant feedback in real time.
- Students also will be having a better learning experience. Using Synchronous classroom via YouTube live session is an entirely different experience compared to traditional classes. YouTube live streaming provides educators with an opportunity to record their session and enable them to use it later. The recording on YouTube also offers students an opportunity to revisit the lessons at their own convenience time.
- Synchronous classroom via YouTube live session is a real-time and On-Demand Live Streaming. The advantages through the On-Demand Live Streaming and real-time learning experience are tools for the educators in getting the latest teaching technology and providing new learning materials. Through our product, Synchronous classroom via YouTube live session enables the educators and the learners to highly engage in intellectual discourse through interactive platforms. We also believe that using Synchronous classroom via YouTube live session to teach our U1 modules, it boosts up the students inspiration to community-driven learning as a whole.

**Commercial Value**

Although the general purpose of Synchronous classroom via YouTube live session is to educate our students, our product can go beyond this aspiration. The future plan is to commercialise it through the ‘paid link’. For now, the link that we set up only can be accessed by our students. After we have gone through a few live sessions and did some improvisation, we will embark to a new phase where we will offer our link for the commercial purpose. Like our university credit hours which can be obtained through the sessions, we will offer credit hours transfer to the students who successfully completed the live sessions with us. We envisioned to commercialise our ‘paid link’. It is not only enjoyed by Taylor’s students but also for students from other institutions. It will be an indirect marketing for Taylor’s University. We observe that the product may indirectly inspire our students and educators to grow as an active community-driven in teaching and learning through internet technology.

**Acknowledgment**

We would like to express our gratitude to Taylor’s University specifically to the School of Liberal Arts and Sciences and e-Learning Academy for their support in this project.

**References**

ENHANCING STUDENTS’ EXPERIENCE WITH H5P LEARNING ACTIVITIES DEVELOPED ACCORDING TO TRIPLE E FRAMEWORK (ENGAGE, ENHANCE & EXTEND)

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Highlights: This project highlights the use of H5P application in the Architecture Theory and History module, with the aim of improving the student’s learning experience by transforming a dry and facts-driven content into a fun and engaging learning activities. Guided by the Triple E framework, the H5P activities have been created based on the structure set by the Triple E Framework: Engage, Enhance and Extend. Although this framework was primarily developed for the K-12 community, the application of the Triple E Framework in this module is also applicable and beneficial in tertiary education context as indicated by the students’ increased performance in the module.

Keywords: Online Learning; Architecture History and Theory; H5P Applications; Triple E-Framework

Introduction
Architecture Theory and History module is one of the compulsory modules offered to Bachelor of Architecture students. The nature of the modules that required the students to memorise lots of images and timeline related to Architecture has made this module a dry and challenging subject for the students. The class observation also indicated that with all the facts to be memorised, the students have short attention span during lectures and tutorials, and these situations have led to the students’ low performance in the module. To overcome this problem, H5P activities have been introduced and made available through the university’s learning management system (LMS).

H5P (HTML5 package) is a free and open-source technology used to create interactive HTML5 content without the need for design or technical experience. It is simple and easy to use with no plugins and no large SCORM packages. H5P is also mobile friendly, which enabled the students to experience the same rich, interactive content despite whatever device they are using. There are different types of interactive activities available through H5P, and each has a different function. It varies from merely disseminating information to a formative assessment tool.

The Triple E Framework, developed in 2011 by Professor Liz Kolb at the University of Michigan, School of Education, was created to address the gap between the usage of education technologies and teaching practice in the K-12 classroom. It is designed to help the educators in evaluating suitable technology tools to meet their learning goals through a set of questions developed for the three components. These questions are provided to help assess the tools and design the learning experiences so that the tools have a positive impact on student achievement and learning outcomes.

Triple E-Framework Application in Architecture Theory and History Lesson
The Triple E measurement tool provides a benchmark for what educators should be thinking about when considering a technology tool for learning. Thus, in the module of Architecture Theory and History, students are being exposed to the technology application of H5P that will be able to help them to achieve the learning goals. By using the HSP application, the Triple E Framework makes sure to consider that while a tool may be “drill and practice”, the educator can create structures around the tool to help meet the three different components of the framework as illustrated below:
Creation of interactive activity such as memory games, image hotspots and interactive videos provides students with immediate feedback on their performance. This is an excellent way of encouraging and motivating students to perform a task and reinforce their learning. Compared to traditional lectures and tutorials, the H5P tools extend the capabilities of the classes more playfully and interactively. Furthermore, H5P promotes self-directed learning as learners can do activities at their own pace and in their own time. When students complete an activity, their performance is recorded in the LMS. This learning analytics helps lecturer to monitor students’ performance and identify weak students in the classroom.

Hence, through the applications of the H5P technology in module Architecture Theory and History, the results of the students are improved tremendously compared to the conventional lecture-tutorial method. Overall, the effects of students getting A in the module increase by 24.96%, whereby the failure rate is reduced from 1.59% to 0% failure rate.

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References
SHAPING THE FUTURE OF LEARNING THROUGH VR IN INNOVATIVE MEDIA

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Highlights: Innovative Media Module (from School of Media & Communication) with collaboration from the Senior Product Specialist of Consumer Imaging and Information Division, Canon Marketing (Malaysia), came up with a series of 360 VR experience (by stitching 360-degree Panoramic photos) to support the teaching and learning experience in Innovative media. The 360 VR experience showcased are ’Stop Motion Expeditions’ by both Cliff and the module leader. The 360 VR experience in the subject of Innovative Media has escalated the potential of virtual technology in education that accelerate, amplify, and expand the impact of effective teaching & learning experience

Keywords: 360 VR experience, 360 VR mobile presentation, Teaching and Learning with Technology.

Introduction
The 360 VR learning experience leads to emerging of virtual technology in education that accelerate, amplify, and expand the impact of effective teaching & learning experience. Adoption of “360 Degrees of Pedagogy” shaping trend for future learning from millennials to centennials and reinforce richer E-interaction and higher-level cognitive learning.

The principles behind this pedagogy comprise of a mix of Technology, Space and Learning together in innovative ways that support a variety of “E-learning” mode to facilitate knowledge transfer - Interactive lesson, Interaction collaboration and Independent self-pace learning that enable learning anytime, anywhere and stay connected 24/7 without boundaries.

As a fact that the engagement of virtual reality is more prevalent in education today, the employment of 360 VR contents address the needs to empower students to find out, to explore and to build their own knowledge throughout the learning journey. In addition to that, the interaction technology helps students become fluent in using digital media (include software, digital images, digital video, web pages, social media, digital audio, and electronic books) to express themselves and demonstrate their learning. Apart from that, the learning process has been designed to provides an opportunity to collaborate with peers, share ideas, try new digital tools, and amplify active learning experiences.

The Description of Innovation
The endorsement of 360 VR learning in Innovative Media Module arose to meet the target “TLLM (Teach Less, Learn More)” initiative in Taylor’s University to equip students with the characteristics and skills that will help them live in this ever-changing technological world. As an 21st Century Educator, it is essential to be able to implement technology, think forward, embrace change and have the ability to allow students learn best when they are taught to their own unique style and ability.

It’s a delighted support from Canon Marketing (Malaysia) to offer their help (both technical and equipment - Canon 5D Mark IV, Canon EF 100mm f/2.8 USM Macro Lens and Pano Head) to create Pano 360 degree photos for our content development. The objective for this module is to introduce students to the different dimensions of digital media to deliver basic technical skills in current digital media technology and practice. One of the projects or assignments requires students to develop and produce stop motion. We use 360 VR contents to expose them to Stop Motion ideas, theories and insights related to current technological media (how to turn still images [photo] to motion [video]) through the subject’s exploration of the creation, consumption and sharing of new ideas.

It enables formation of a learning space built for active learning. The adoption of this new pedagogies provide advantages that embedding new skills in students, teaching them how to solve problems, to be more creative, to collaborate with others. This learning space offers us flexibility to explore and to build his own knowledge and to explore new frontiers.

Background
The Innovative Media Module endorsed the use of 360 learning experience in which provides revolutionary avenue to shape a new trend that allows educators to rethink how they can best leverage space and technology to improve the learning process. Its range in line with the widespread use of mobile devices that support a variety of “blended learning” models (online and virtually based) to meet the future learning challenge from millennials to centennials and reinforce richer E-interaction and higher-level cognitive learning.
The 360 VR learning contents are built using Canon 5D Mark IV, Canon EF 100mm f/2.8 USM Macro Lens and Pano Head and software such as Photoshop, and uploaded F5P Interactive Content option via our TiMES (Taylor’s Integrated Moodle e-Learning System). The process of creating the 360º panoramic used a single camera shot which required stitching together of flat images. By using a special parabolic lens (Macro lens) attachment, digital camera and software, this optical system captures a complete 360º panoramic image. The resulting image is a complete 360º horizontal panorama with a 100º vertical field-of-view (50º above and 50º below the horizon). Then, compile and used Photoshop to create a 360º panoramas with 100º vertical field-of-view enable students to see all of a scene. It enable the navigation on the selected hotspot that enable hyperlink to website, video, online collaborative platform, clouds and other platforms in order to enhance the active and rigor learning in the extensive curriculum initiatives. Curriculum can be augmented by re-purposing available 360 images integrated into lessons. Examples showing the Stop Motion video and animated representations throughout the process development enrich comprehension and provide students with constructive way, to gather and evaluate relevant information in VR exploration.

**Importance to education**

Integrating technology into 360 VR learning mandates flexibility and activity-based space planning, where it is now take place in classroom without wall, supporting richer E-interactions and higher-level cognitive learning. Within the 360 VR learning environment that supports the coexist of self-directed work at both web and mobile based as well as collaborative tasks in creating a new behaviours of learning that are the direct result of new technologies. As mentioned by Jain (2016), “Don’t Teach Me, Let me Learn”, it is the learning style that preferred by millennials. We should emphasis on Rigorous learning. Rigor means framing lessons at the high end of the knowledge Taxonomy [Analyzing, Evaluating & Creating] that facilitate the opportunity for every student to learn in innovative ways that is engaging, enabling them to reach their full potential and develop skills that will help them thrive in the future.

![Critical Thinking](Image)

Figure 1: The 360 VR learning “digital environment” that encourage rigorous learning.

The 360 VR learning experience that embedded multiple online platform such as mind-map, mood board, treatment enable students to plan their Stop Motion idea from Zero to hero. Furthermore, the online collaborative software like Script Writing and Storyboarding enable them to interacting and exchange their creative ideas. The results reached with the use of 360 VR learning (embedded online platform and software) shows the attributes that make the ideal of learning and develop more interests and engagement among students, making the learning easy to a higher level.

**Advantages and Awards**

With the 360 VR learning, the students are actively engaged. The 360 environments comprise of a mix of Technology, Space and Learning together in innovative ways that support a variety of “E-learning” mode to facilitate knowledge transfer - interactive lesson, interaction collaboration and independent self-pace learning that enable learning anytime, anywhere and stay connected 24/7 without boundaries. Students achieve a new awareness for the actual events, the locations, the times, and how they fit together. They gather relevant information for the development of their project or assignment.

The Stop Motion projector assignment has received recognition in Hainan International Tourism Festival Chine ASEAN 2018 Student Culture Week - University student short film competition (students won the first runner up in Animation/Stop Motion Category). In 2019, students’ Stop Motion project or assignment has been showcased as PSA that collaborate with “Kloth Cares” in BioUsahawan 2019, an entrepreneurship-based event held from 15 - 16 March.
2019 at Kuala Lumpur Convention Centre. The project is handled by Malaysian Bioeconomy Development Corporation (Bioeconomy Corp), an agency under the purview of Ministry of Agriculture and Agro-based Industry (MOA) that exposes students to the entrepreneurial world and to show the world what the students can offer, especially in terms of sustainability. It’s a proven result from the innovative approach that accelerate, amplify, and expand the impact of effective teaching & learning experience.

Video- Coca cola - https://drive.google.com/file/d/10OlxFoRXakkJU2uS7bT8VDqUrzYI9579/view?usp=sharing


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References


PERSONALISED LEARNING THROUGH INNOVATIVE TEACHER-STUDENT PARTNERSHIP

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Highlights: Recently, My Graduate Capability (MyGC) developed by the innovators of the school of engineering has been used as a tool to aid the learners keep track of their Taylor’s Graduate Capabilities (TGC) achievement level on a semester basis. An assigned mentor helps through periodic meetings to monitor the implementation of the continual quality improvement (CQI) plan catered for the non-achieved TGCs based on registered modules. A pilot study for two cohorts was in place and meetings are data-driven from the developed macro-enabled integrated platform linked to the university learning management system. This is an important initiative for the learner to know his TGCs achievement status and the programme in particular, to track the achievement of the graduate capabilities during the course of the study to ensure that TGCs are achieved upon graduation.

Keywords: personalised learning, mentor-mentee, graduate capabilities

Introduction
In a highly competitive and challenging 21st century workplace, skilled graduates are relevant, responsive and work-ready to stay ahead in the global marketplace (Abdulwahed, Baidi, Hasna, & Pokharel, 2013). The key purpose of any institutions of higher learning (IHL) is to produce a sustainable future-ready graduates. With this frame of mind, stakeholders expect the IHL to enhance university education to meet the ever-changing global demands of industry, community and the society in general. Today’s generation of students called the “millennials” have different learning styles compared to their predecessors and the IHL have to create the so-called “millennial-centred learning environment” (Laskaris, 2016). These learners have shorter attention spans, value information that is relevant to their lives, do things rationally, preferred relaxed environment, and prefer personalised learning environments (Novotney, 2010). The IHL need to re-focus the teaching and learning strategies to cater the needs of these learners. Research showed that millennials want and benefit more on one-on-one mentorship (Meyer, 2017), prefers working in groups than working alone, and integrate technology into their learning experiences (Nicholas, 2008) and likes to merge digital with real-world situations (Jenkins, 2017). Some strategies are being implemented by IHL in this direction – blended learning, reduction of face-to-face teaching and increased self-directed learning (e-Learning Academy, 2014). The teaching and learning approach at Taylor’s University is geared towards addressing the need of the millennials to ensure that each learner is able to acquire and demonstrate the discipline-specific knowledge, cognitive capabilities, and the soft skills, among others. Imperatively, the assessment of such skills is done at the end of the programme and there is little way to do continual quality improvement (CQI) to monitor the learning progress and achievement of Taylor’s Graduate Capabilities (TGC). Thus, to fill this gap, the Electrical and Electronic engineering programme of the School of Engineering piloted the teacher-student partnership project to cater the needs of the students through a mentor in a semester-based personalised learning journey towards achievement of the TGCs. The innovators developed the My Graduate Capabilities (MyGC) consisting of a My Study Plan (MySP) and TGC scorecard containing the up-to-date achievement level of the TGCs as a tool used by the mentor and the mentee in developing the CQI plan to further enhance the mentee’s learning skills throughout the semester learning journey.

Content
MyGC is a teacher-student partnership learning model is shown in Figure 1 and is piloted for the Electrical and Electronic Engineering (EE) programme beginning March 2019 semester. It is a personalised semester-based learning journey for the students with the guidance and support of a teacher (acting as mentor) to provide support and supervision of the students’ learning needs and progress throughout the semester. The EE programme has less than 20 students per intake, as such, it is easier to implement the project and at the same time helps the school to reduce the attrition rate. One of the objectives of MyGC is to promote belongingness among the students and instil in their minds that mentors are their second parent who are willing to listen and address their academic concerns.

Based on Figure 1, the teacher-student partnership follows the mentor-mentee meeting guide where the mentee need to accomplish the tasks and report to the mentor on a regular basis as follows:

**Week 1-2.** Collect the copies of your MySP and MyGC from your mentor. Accomplish the Reflection and CQI form. Section A of the form should contain your reflection of the TGC scores, the skills that you are doing well, and skills that you need further improvement. In section B, list down your plan and activities intended to improve your learning skills and achievement of the TGCs. In section C, list down the things that you would like your mentor to help you. Send the softcopy to your mentor. Reflection and CQI form is provided. Also accomplish a pre-assessment survey form.
Figure 1. Personalised Semester-based Learning Model

**Week 4.** Print the copy of your MySP and MyGC and schedule a meeting with the mentor. Discuss MySP and MyGC and seek approval of the CQI plan and activities for improvement. The 14-week learning journey will be monitored by your mentor. You are encouraged to trust your mentor, attend meetings and execute the CQI plan and activities accordingly.

**Week 7.** Schedule a meeting with your mentor for Midterm health check. This is to assess your performance in the recent assessment tasks from registered modules. Kindly be open about the issues/struggles that you are facing in any of your modules including the implementation of your plan and activities. Your mentor will coordinate with your lecturers to get an update of your class performance.

**Week 12.** Schedule a meeting with your mentor to discuss the modules that you need to register for the next semester. This is to ensure that you are on track and pre-requisites are properly observed.

**Week 14.** Accomplish the post assessment survey form. Also discuss your preparations for the Final examinations and submissions of required documents.

From week 15 onwards, assessment of the students’ performance will be conducted including the generation of updated copy of the MySP and MyGC for the next cycle of implementation. Should this innovation be successfully implemented until the students’ final semester, it is expected to increase the students’ chances of passing the registered modules, instill self-belongingness to the programme, achieve the TGCs upon graduation, and develop his holistic education. The commercial value of this project is on the generation of MySP and MyGC from the macro-enabled software package based on the students’ semester by semester academic performance.

**Acknowledgement**
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**References**


BLOCK-BASED PROGRAMMING: THE WAY TO INTRODUCE COMPUTER PROGRAMMING

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Highlights: Learning programming is never easy. This research is looking at the suitability of the new introductory programming of block-based programming tools (a visual programming approach) such as from Code Studio by code.org approach for a preparatory course for Diploma in Information Technology learners. Transitioning and motivational values of individual learners are important in learning programming. This study contributes and reports the students’ transitioning from introductory to professional programming environments using Keller’s ARCS Model in preparatory environments. Then the transfer to more sophisticated programming tools is measured. The results show that the students are interested and confidence of the tool.

Keywords: Block-based programming, visual programming, computing, preparatory course

Introduction
Learning programming is never easy. In the past years, the demand for software development has increased rapidly. Skilled software developers are needed to meet the job demand. Often, software development companies will scout for talent from university students. This phenomenon has encouraged many people to learn to programme. However, teaching programming is a challenge such as instilling problem-solving and logical thinking skills at open-ended programming problems, leading to high failure rates and dropout in most of the Computer Science Studies (Othman, Hussain, & Nikman, 2017).

Previous researches have examined collaborative and cooperative learning in the university setting to help students in their studies. They have shown that collaborative and cooperative learning is a practical learning approach than those associated with other instructional methods (Huang, Liao, Huang, & Chen, 2014; Lin, Huang, & Cheng, 2010). No doubt that group learning will instil and improve logical thinking skills as group learning encourage and promote verbal interaction, group processes, positive-interdependence and individual accountability. However, to strengthen the fundamental knowledge, we need to prepare and motive the learner before giving them system development tasks. Main reasons are because some students, especially those with little or no prior programming experience, struggle to understand and form the process of programming. The amount of theoretical and technical concepts students need to master can lead to loss of interest in programming. One of the strategies to engage and address the lack of interest is via block-based programming tools. Potential of block-based programming tools such as ‘Alice’, ‘Scratch’, ‘MIT App Inventor’ for Android development and ‘Hour of Code’ challenge launched by code.org could be used as introductory programming environments to beginners. Research has shown block-based programming tools help the learners in acquiring fundamentals programming skills using Keller’s ARCS (Attention, Relevance, Confidence and Satisfaction) Model (Nel & Nel 2018). They found that their students have benefited from the proposed learning platforms and have successfully changed their attitudes and engagement in learning programming.

Methodology
This study adopts Nel and Nel (2018) approach for Diploma in Information Technology learners by selecting the selection and control flow topics as the preliminary experiment. To see the effectiveness of the block-based programming tools, two semesters students (e.g. semester 1 with little or no prior knowledge of programming and semester 2 who has gone through a semester of programming syllabus) were used as part of the experiment. Minecraft and Flappy Bird ‘Hour of Code’ lessons were used as part of the experiment (refer to Figure 1). In the lessons, the instructor can view the student’s progress via the lesson level type, details and status. The instructor can view the status of the student, whether they have used too many code blocks to complete a lesson, or have yet to complete the lesson.

Results
Table 1 depicts the demographics of students in semester 1 and semester 2. Majority of the students have played at least one educational game before. After they have attempted the ‘Hour of Code’ of Minecraft, the feedback was collected in two categories: (1) interest and confidence level of programming, and (2) satisfaction level. In semester 1, 65.7% of students agreed that block-based programming gives them the level of confidence and interest in programming. Among 31.4% of students find the level of difficulty is acceptable, and 45.8% of students find that coding using block is easy. The percentage of agreement on the interest in programming increased in semester 2 students. It
marked a total of 85.8% level of confidence and excitement in learning programming. They accepted the level of block-based programming is easy (71.4%). Overall, majority of students from semester 1 (68.6%) and semester 2 (85.7%) students would prefer the block-based programming game to be included in the course curriculum as part of the learning activity. The results of this study have shown similar acceptance level with Nel and Nel (2018) that novice learners have benefited from Code Studio learning platform and have positive reactions and attitudes on further engaging the learning with block-based programming as the transitioning from introductory to the professional programming environment. The results also have shown that there is a significant improvement in their attention span and confidence level in class after the block-based programming was introduced.

Figure 1: Code Studio Minecraft and Flappy Bird lessons for control flow structures.

Table 1: Feedback from the students using Code Studio.

<table>
<thead>
<tr>
<th>Semesters</th>
<th>Gender</th>
<th>Have played educational game before</th>
<th>Such game should be included in course curriculum as learning activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Yes</td>
</tr>
<tr>
<td>Semester 1</td>
<td>27</td>
<td>8</td>
<td>42.9%</td>
</tr>
<tr>
<td>Semester 2</td>
<td>5</td>
<td>2</td>
<td>57.1%</td>
</tr>
</tbody>
</table>

This study will further test and evaluation the Keller’s ARCS (Attention, Relevance, Confidence and Satisfaction) Model on the outcomes of the block-based programming strategy. It is in hope to improve the novice learners’ experience and interest in programming. This understanding will advance our understanding of how best to introduce students to these block-based programming to 21st-century skills and whether a new tool or environment is needed for the students to be successful in the computational futures.

References
USE OF H5P INTERACTIVE VIDEO TO SUPPORT ACTION LEARNING OF PLANT TISSUE CULTURE TECHNIQUES

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Highlights: Plant tissue culture encompasses a variety of laboratory techniques used to grow plant cells or tissues on a nutrient culture medium, strictly under sterile conditions. Due to its demanding growth conditions, it is crucial for students to be well-informed and well-prepared on the techniques to overcome risks of contamination. Usage of H5P interactive videos were proven to support action learning by deepening the level of understanding among students on the techniques as shown by reduced contamination incidents during the practical sessions. This also leads to an improved learning efficiency and cost-effective practical sessions with minimal repetition in executing plant tissue culture experiments.

Keywords: Agriculture biotechnology; plant tissue culture; action learning; H5P interactive video; instructional video

Introduction

Plant tissue culture (PTC) is defined as “the in vitro culture of plant protoplasts, cells, tissues or organs under controlled aseptic conditions which leads to cell multiplication or regeneration of organs or whole plants” (Bhatia, 2015). Controlled aseptic conditions, which require the surrounding environment of the tissue culture to be free of any microorganism, is considered as the key to successful propagation of plants in vitro. PTC plays an important role in improving crop production, that leads to food security and meeting the demands of increased population. Therefore, for future biotechnologists, mastery in PTC is an acquired skill and core competency to be possessed (Bhatia & Sharma, 2015). As PTC heavily involves deep understanding and hands-on practice on laboratory techniques, action learning is the most suitable approach to ensure students are able to retain the information and apply them in the future.

Action learning means “learning from action or concrete experience, as well as taking action as a result of this learning”. It is sometimes combined together with action research, which is a cyclical iterative process of action and reflection on and in action (Zuber-Skerritt, 2001). Both action learning and action research are applicable in the case of science-based practical or laboratory sessions, as students learn how the techniques are factually conducted in real-life settings. Using interactive tools are of great benefit to students, who are expected to be able to directly apply and practice what they have learned during laboratory or practical sessions. As the settings in the laboratory are based on real-life situations, expenses owing to equipment and consumables might be considered as the downside of action learning approach, especially in PTC. Repetitions of hands-on sessions as part of the process for acquiring laboratory techniques owing to inaccurate practice or weak understanding of PTC techniques would lead to an increased cost. Minimisation in repetitions is one of the ways to increase the efficiency of action learning, especially for practical sessions like PTC as well as many other skill-based modules. This can be achieved successfully via interactive video tools.

Content

PTC techniques is a topic covered under the Agriculture Biotechnology module, for the Biotechnology degree at Taylor’s University. As part of the topic, students learn how to culture and propagate plants in the laboratory using appropriate PTC techniques and hands-on practical sessions are included. Maintaining aseptic condition is one of the most commonly occurring challenges, not only during practical sessions but also practices in research and the industry (Phelan & May, 2015; Orlikowska et al., 2017; Kim et al., 2017). Failure in maintaining aseptic conditions would result in wastage of time and consumable, thus increasing the laboratory cost. In order to minimise contamination during practical sessions, students need to be well prepared and informed before conducting the practical session. Instructional videos containing information about do’s and don’ts as well as visual portrayal on PTC techniques were provided to the students to be viewed prior to the session. However, repetition of practical sessions still occurred due to poor techniques. There were also no means to either assess whether students have watched the video provided nor their level of understanding prior to the practical session. Prior study had shown that students often disregard large segments of educational videos (Guo et al., 2014). This is also supported by a study conducted by MacHardy and Pardos (2015) in which it was found that such videos contributed little to student performance.

According to Brame (2016), there are three elements to be considered for video design and implementation which can help in maximising instructional videos’ utilization in the classroom: cognitive load, student engagement and active learning. Together, these elements have proven to provide a solid foundation for the use of videos as an effective educational tool. Therefore, H5P interactive videos were chosen as a means to improve the efficiency of
instructional videos in teaching and learning in this module. H5P interactive video is a HTML5 based interactive video content type that helps add multiple choice and fill-in the blank questions, pop-up texts, as well as other types of interactive activities in a video. The video can be obtained from multiple online video platforms or by uploading self-recorded videos. H5P interactive video is able to engage students and test their knowledge in an active online environment. Many studies have demonstrated that retrieving information from memory, known as “the testing effect”, can enhance long-term retention of information (Roediger & Karpicke, 2006). This is achieved by providing intermittent tests or quizzes (Schacter & Szpunar, 2015).

The use of H5P interactive videos in place of the usual instructional videos, prior to practical sessions has shown a significant decrease in the level of contamination as well as repetitions. Furthermore, less instructions and error monitoring by laboratory officers too reflects better attention paid by students. Based on the testimonials provided by students, they had better level of understanding in regards to the PTC techniques and were also aware and vigilant of mistakes to be avoided. They believe this increased awareness with the help of H5P interactive videos increased the success rate and reduced contamination. As students had to watch the video all over again if they answered the questions wrongly, students were also able to pay attention once again on any points which they may have missed out during their first watch. Since this practical encompasses three sessions, thus repeated viewing of the H5P videos prior to each session further increased their success and enabled them to remember mistakes to be avoided. This is an effective approach to action learning. Albeit indirectly, the use of H5P interactive video is able to enhance the students’ core competency in terms of practical skills, which is very useful for them in the future. As H5P interactive videos have shown to be useful to improve the efficiency of regular instructional videos, this also means that the practice of using H5P interactive video can be adopted by other modules or programs, especially those involving action learning based practical sessions.

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References


TEACH LESS, LEARN MORE: SUSTAINABLE EDUCATIONAL APPROACH THROUGH SAVE MODEL

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Highlights: SAVE [Supplementation, Augmentation, Verification, Evaluations] is a model that combines technology-based eLearning and the best aspects of in-person teaching aims at providing learners a more comprehensive understanding of the basic notions in chemistry. Chemistry concepts were taught in the classroom and supplemented by self-directed learning resources such as lecture recordings and tutorial questions. Online interactive simulations such as PhET and Labster were used to augment learners’ understanding. The accomplishment of learning was verified through experiential activities in practicum and case studies. Results of this innovation in terms of learning gained was evaluated over practical test and written examination.

Keywords: chemistry, supplementation, augmentation, verification, evaluations, sustainable future learners

Introduction

Statistics have shown a substantial reduction in the number of Malaysian learners in the STEM subjects in the last decade. While STEM subjects are important to train the learners on their analytical capabilities and logical thinking skills (the skills set that is essentially required in the workforce in this VUCA world), many learners lose interest in studying STEM subjects or failed to strive on in their pursuit of the subjects due to difficulties on knowledge comprehension. Chemistry, particularly, is among many learners as a complex and an abstract subject that relies on making sense of the invisible and untouchable concepts. The lacking in interactive and demonstrative materials for visualisation of chemical processes could possibly be the reasons that plummets learners’ interest in learning this subject (Chittleborough, 2014). An innovative SAVE model was therefore used to enhance the learning potential of the learners and nurture their interest in learning chemistry. This innovation can potentially help Malaysia in meeting its national demand and to advance further in STEM fields.

The Innovation

SAVE model is a blended learning innovation that has technologies integrated into the teachers’ practice to match to pedagogy and subject content to meaningfully and purposefully enhance learning opportunities. In the model, just as with the ordinary classroom, chemistry concepts were taught in contemporary ways via lectures. Online self-directed learning resources such as lecture recordings, YouTube videos, and tutorial questions on TIMeS that transform content knowledge in many ways communicable to learners were used to supplement lectures. In order to engage learners and promote deeper levels of comprehension, information-intensive chemistry concepts that were generally considered as abstract as well as unseen were augmented with interactive and visual resources such as PhET and Labster. Learning was then made more relevant by exposing the learners to the chemistry concepts again during practical sessions and questions based on real-world situations. Experiments in the laboratory and case studies allow the learners to verify the subject content learnt. By facilitating and asking the right questions, teachers can stimulate learners to incorporate identifying, comparing, predicting and testing activities thus nurturing problem-solving skills. Results of this innovation in terms of learning gained was eventually evaluated over practical test and written examination. In a nutshell, learners use their investigative skills to gather and study information, their analytical skills to evaluate and make sense of information, and their inventive skills to determine how the information can solve a problem.

Such setting can be seen as a combination of contextual and experiential learning. Supplementation and augmentation in the SAVE model support contextual learning that focuses on the learners constructing meaning by investigating the information from various resources provided to them and understanding the information based on their own experiences gained (Pramila, n.d.) while working on the tutorial questions and interactive simulations. Augmentation and verification in the model, on the other hand, support experiential learning that emphasises a continuous process of experience, reflection, conceptualisation and experimentation in mastering subject knowledge. Effective learning is seen when learners progress through a cycle of (1) having a concrete experience followed by (2) observation of and reflection on that experience which leads to (3) the formation of abstract concepts (analysis) and generalisations (conclusions) which are then (4) used to test hypothesis in future situations, resulting in new experiences (Mcleod, 2017).

SAVE model aligns with the Malaysia Education Blueprint where STEM is one of the priorities identified. It incorporates active learning in teaching chemistry that is designed with consideration of classic scientific approaches...
which involves observation, analysis and justification. Subsequently, SAVE model allows learners to be kept in balance with both teacher- and student-centered learning as learning through understanding and experience will enhance the sustainability of subject learning outcomes. Making online learning an integral component of higher education and lifelong learning using blended learning models has been one of the key initiatives of Ministry of Education Malaysia together with higher learning institutions (HLIs) in achieving Globalized Online Learning that is outlined in the Malaysia Higher Education Blueprint 2015-2025. Malaysia, with its internet penetration rate risen to 85.7% in 2018, is in a good position to move to a learning model where technology-enabled innovations are harnessed to democratise access to education and offer more personalised learning experiences to all learners. In addition to that, enrichment of student learning experience through SAVE is in line with the Taylor’s Curriculum Framework that works towards instilling the culture of happiness, love and mutual respect in schools and varieties in a bid to create a fun and positive learning environment. It will also equip graduates with Taylor’s Graduate Capabilities that will prepare them with future-ready skills for the 4th Industrial Revolution.

Such approach enables learners to attain all round development according to his/her own attributes as opposed to traditional teacher-centered method that focuses on rate learning and memorization. It provides instructor with a way to cater for learner differences as it allows learners with different learning abilities and diverse multiple intelligence to learn according to their preferred style. It will empower learners to be analytical and learn make justification through data driven observation. Self-directed learning resources such as lecture recordings, tutorial questions and online interactive simulations provide an audio and visual record which learners can repeat as many times as they need. Using interactive simulations have shown some evidence that these labs can be helpful in enhancing learners’ attitudes, improving preparedness for hands-on lab, and strengthening conceptual knowledge. These self-directed learning resources can be found easily and played back that grants learners to make a deliberate choice on methods and pace which would benefit them better. Subsequently, it would also decrease the learners’ anxiety and stress specifically for revision purposes. Based on a survey conducted (Figure 1), majority of the students (80%) agreed that SAVE model is useful in learning chemistry as compared to teacher-centered learning (87%).

![Figure 1: Responses of students for the teacher-centered learning and SAVE model](image)

Obtaining a quality education is the foundation to creating sustainable development. In addition to improving quality of life, access to quality education can help equip learners with the tools required to develop innovative solutions to the world’s greatest problems. This innovation is developing approaches to achieve SDG4 (Target 4.4) through the provision of quality education that enable the increment on the number of youths who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship (United Nation, n.d.). Thereafter, it will also address SDG10 (Target 10.1) by progressively achieve and sustain income growth of the bottom 40% of the population at a rate higher than the national average due to increased competence (United Nation, n.d.). It is an instructional model which is valid for any kind of education that provides an organized process for developing instructional materials that can be extended to other subjects. This innovation also exhibits the potential to stimulate learning interest among the learners which guides them to achieve the designated learning outcomes. Even though originally this innovation was designed as a supplement to traditional classroom learning, it can be further developed as a workplace training model for career or professional enhancement.

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**References**


ADOPTION OF CONVERSATIONAL FRAMEWORK USING MOJO

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Highlights:
Learning using the Mobile Journalism or MOJO concept has enabled students to be more analytical, creative and tolerant towards religion, race and the environment. This concept was applied in tutorials and assignments where students used their smartphones to capture still pictures, visuals and audio. To evaluate how much MOJO had supported the learning strategy the Conversational Framework was used. The uniqueness of this concept allowed the students to apply theory to real life situations using their knowledge in technology while putting in practice the ethics of interacting with the public so as to promote sustainability in learning.

Keywords: MOJO, learning, creativity, sustainability, ethics, self-expressive.

Introduction
At the institutions of higher education, teaching is no longer about imparting knowledge but more of mediating learning. According to Laurillard (cited in Ramsden, 1992), the aim of teaching is to make student learning possible. The conventional lecture sees the transfer of knowledge from the lecturer to the students but does not necessarily transfer the acquired knowledge to different setting, hence the difficulty to relate theory to practice. Ramsden also quoted that teaching – learning is a type of conversation, hence the creation of Conversational Framework identifying the necessary activities to complete the learning process. Vygotsky (1962) demonstrated that we cannot separate knowledge to be learned from a situation. This means that students acquire knowledge from the experience they know in relation to a particular situation. Brown et al (1989a) demonstrated the unity of problem, context and solution when the problem is experienced, unlike in most class activities where solutions are given.

Learning has become a self-directed process in order to match the characters of the young adult learners in the higher learning institutions. With the objective of learning sustainability and with these two main factors in mind, I have decided to adopt MOJO in my Crisis Management class. MOJO as a media platform has helped me to materialise the activities planned based on the Conversational Framework.

Why MOJO?
This technology – learning based concept uses the smartphones to capture images, audio and to create a video. Based on the Conversational Framework, MOJO as the media platform has created differences in the outcome.

Figure 1: The Conversational Framework identifying the necessary activities to complete the learning process. Laurillard (2002).

The framework covers four areas of communication which were applied to tutorial and assignment questions:
- Discussion
- Adaptation
The importance of applying MOJO in education

MOJO applies research of the subject matter, plans the delivery of the subject matter, produce the planned delivery and reflects on the content and impact of the media product. All these activities are closely related to the four areas in the Conversational Framework. A continuous practice of MOJO will produce:

- graduates equipped with critical thinking
- students who are enhanced with personal skills
- transfer of knowledge initiatives from theory to practice

The uniqueness of this approach

Each time when I asked the students to submit their tutorial or assignment work using MOJO, they seemed to be surprised as they seldom used these specific skills and talents to create videos or voice recording to such a large extent. The specific skills involved are as follows:

- Planning
- Research
- Delivery

As this approach uses the media platform, the students did not feel stressed but enjoyed completing the given tasks.

The advantages towards education and community

Table 1: Advantages of using MOJO

<table>
<thead>
<tr>
<th>Education</th>
<th>Creation of creative learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Towards a continuous assessment as each task exposes the students to different experience</td>
</tr>
<tr>
<td></td>
<td>Inculcate critical thinking, planning, reasoning, reflection and action</td>
</tr>
<tr>
<td></td>
<td>Learners are able to critically review the outcome of MOJO and make improvements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community</th>
<th>Integration knowledge, learning relevant/ connected real life situations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flexible time frames - learners work at own pace</td>
</tr>
</tbody>
</table>

References


THE ADOPTION OF BIM 360 AS A CLOUD COLLABORATION PLATFORM FOR METHOD OF DOCUMENTATIONS AND MEASURED DRAWINGS MODULE

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Highlights: The Methods of Documentations and Measured Drawings are aimed at preserving the value of heritage buildings. However, the production of drawings and coordination methods still rely on traditional approaches where the workflow is fragmented, hence resulting in issues such as discrepancies, inaccurate drawings, insufficient information, poor means of communications and visualization, redundant work process and dependency on hardcopies. As the current building industry is aligning towards sustainable project delivery, it is vital that an integrated and innovative approach is adopted. This paper will address the highlighted issues by exploring the applications of BIM 360 as cloud-based eLearning platform for coordination of measured drawings.

Keywords: Measured Drawings, Cloud Collaboration, Cloud Computing, Common Data Environment (CDE)

Introduction
Heritage buildings are iconic and symbolize the backgrounds of a nation’s identity in both historical and cultural contexts. Mustapa et al. (2005) reported that there are 39,000 heritage buildings in Malaysia that were built between 1800 and 1948. To date, a total of 183 buildings have been gazetted as national heritage. Unfortunately these buildings still face threats of defects, negligence and deterioration (Ali et al., 2018; Harun, 2011). In the current architectural conservation study, the process of preserving the values of heritage buildings has been taught in specific modules such as Methods of Documentations and Measured Drawings. However, the production of historical building documentations is still based on traditional 2D approach where the documentation process is conducted manually, using written reports, 2D drawings, photos and sketches (Harun, 2011). This method of documentation is time consuming due to the nature of work which is disparate and fragmented. Furthermore, students are still depending on the traditional approach of coordination by showing drawing progress in paper format. The approach would result in discrepancies where the drawings are not representative and the information associated would encounter issues of unreliability, insufficiency limited means of visualization and communication, redundant work process and high dependency on hardcopies for review and coordination between tutors and students.

In addition, students depend heavily on multiple conventional tools to produce a single set of drawings, for instance AutoCad 2D for 2D drawings and SketchUp 3D for building modelling, where it consumes time and is prone to unreliability (Eastman, 2011; Shafiq, 2013). As the current industry is aligning towards sustainable project delivery such as Building Information Modelling (BIM), it is vital that an integrated and innovative approach is adopted. Hence, the aim of this paper is to address the highlighted issues by exploring the parameters of Autodesk BIM 360 as an e-Learning platform for coordination and review of measured drawings activities. This cloud-based system integrates in real-time, the 2D & 3D drawings as well as the model information in a single platform namely the Common Data Environment (CDE) for efficient coordination and reviewing process among project team members. The findings of the case study had shown significant improvement in supporting the coordination process with high level of accuracy, speed and improved communication. This innovative approach would further enhance the sustainable way of learning in future architectural studies.

Definition of Collaboration for Revit and BIM 360 Cloud Server
The course requires students to utilize a single software namely Autodesk Revit 2019 as the authoring tool to produce 3D models and drawings of heritage buildings. The built-in functions of the software, namely ‘Collaboration in Revit’ enables the project team members to concurrently authorize a model in a single and integrated cloud-based server namely Autodesk BIM 360 Team. The cloud platform connects team members as well as the lecturers with direct, real-time chat within project models to reduce dependency of traditional face-to-face coordination and usage of conventional tools such as email and phone.

Case Study on the Adoption of BIM 360 Team for Measured Drawing Coordination
The measured drawing work production process involves collaboration among students and monitoring by the lecturers. Collaboration among students becomes problematic when coherence and accuracy of 3D building model and drawings authoring fail to keep up with constant amendments and development. Mistakes in information input may occur if students are not able to keep track on the updated status of the 3D building model and drawing development. Students’ work progress monitoring by lecturer is not efficient when access to the 3D building model
softcopy is limited due to time and location constraints. Progress review often requires physical drawing printouts which may incur cost and time. Students may not be able to track previous review comments if documentation is not executed properly. The lack of coordination among students and lecturer appears to be the main challenge for effective work production and progress monitoring in measured drawing work production.

As shown in Figure 1, the above issues could be addressed by leveraging the functionalities of Revit’s Collaboration and Autodesk BIM 360 inclusion into the current process. Collaboration among students is made possible via Revit’s Collaboration tools which allow real-time access to the common data (3D building model and drawings) on a network platform. Autodesk BIM 360 offers the convenience of Cloud Computing by providing the network infrastructure also known as the Common Data Environment (CDE) to store, reload and synchronize the common data efficiently. Furthermore the workflow supports three (3) main elements of drawing coordination namely Collaboration, Coordination/Review and Monitoring. BIM 360 Team grants the lecturer access to the real-time and updated version of the common data for progress monitoring. The Document Management tool in BIM 360 serves as the web interface for coordination and progress review. Lecturers are able to view students’ work, provide comments and annotations of 3D building model, and drawings can be made either in co-located or remotely through live review. All these enable students to keep track on the feedback and respond accordingly.

![Figure 1. The BIM 360 Workflow for Coordination of Measured Drawings](image)

**The Benefits of Cloud Collaboration for Coordination of Measured Drawings**

Further to the applied case study, a preliminary survey was conducted with 20 students and lecturers actively involved in the measured drawing process to further assess the potential benefits of BIM 360 workflow for efficient drawing and model collaboration. Respondents are required to rate based on scale of agreement from ‘1’ to least agreed and ‘5’ to most agreed and the results are displayed in Table 1 below.

<table>
<thead>
<tr>
<th>Benefit Factors</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (M)</td>
<td>Rank (R)</td>
</tr>
<tr>
<td>Improved time efficiency and speed</td>
<td>4.52</td>
</tr>
<tr>
<td>Enhanced and effective communication among team members</td>
<td>4.33</td>
</tr>
<tr>
<td>Improved drawing and model visualization for coordination purposes</td>
<td>4.31</td>
</tr>
<tr>
<td>Enhanced quality of drawings and model</td>
<td>4.22</td>
</tr>
<tr>
<td>High potential to reduce risks of errors/discrepancies in drawings and model</td>
<td>4.18</td>
</tr>
<tr>
<td>Centralized and integrated information</td>
<td>4.12</td>
</tr>
<tr>
<td>Improved understanding of project</td>
<td>4.07</td>
</tr>
</tbody>
</table>

**Conclusion and Recommendations**

Considered as a rapid emerging technology, Cloud-BIM based computing has become a new research area in architecture, engineering and construction (AEC) industry since year 2010 (Afsari, 2016). In Malaysia, efforts have been...
made to spearhead BIM-based collaboration to Level 2 by year 2020 (CIDB, 2017). Hence, to keep up with the upcoming trend it is essential that this sustainable approach to project delivery be adopted especially within the architectural conservation education as currently, the industry is still facing numerous challenges to adapt new technologies into its practices. The cloud collaboration process will provide significant impact as a powerful tool in transforming the fragmented method of collaboration into an efficient and highly integrated workflow to support the process of teaching and learning in the near future.

Acknowledgement
The authors wish to acknowledge the support of Taylor’s University eLearning Academy (eLA) for this paper. Special thanks to the survey participants who had contributed their valuable input and time.

References
INSPIRING INNOVATIONS FOR 21ST CENTURY STUDENTS’ SUSTAINABLE FUTURE

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Highlights: Apart from maintaining the quality of teaching excellence, Taylor’s University also offers students the opportunity to develop their non-academic skills as part of their holistic education. In September 2014, the SHINE Portal was launched to underpin the SHINE Award Programme. This is the first Malaysian Institution of Higher Education to undertake such a programme, where the 2nd transcript recognises the holistic achievements and accredits the students’ involvement in co-curricular activities; aiming to sustain future employability. This portal acts as a one-stop centre to empower students to develop their life-long learning skills and emotional wellbeing.

Keywords: Holistic Education, Graduate Employability, Life-long Learning Skills, 2nd transcript.

Introduction
As reported in EduAdvisor, Leo (2018) found that more than 200,000 graduates from Malaysian institutions of higher learning remained unemployed for a long period of time. In reality, being a fresh graduate with excellent academic results do not guarantee job placement. Leo (2018), postulated that 58% of graduates portray incompetent attitudes and 52% have poor command in English. Currently, the employment sector demands candidates with proven people-management aptitudes. This demand necessitates an education system that measures and records students’ soft skills such as communication skill, interpersonal and intrapersonal skill, critical thinking and problem-solving abilities, leadership traits, and entrepreneurship skills, acquired from varied experiences during their time at these institutions of higher learning.

Conventional education has contributed greatly to the current levels of industrial and technological advancement. However, in order to face the 4th Industry Revolution and beyond, with a focus on the demands in the current employment sector, a form of disruptive innovation within the education system was required. With this in mind, Taylor’s University launched the SHINE Portal to bridge the gap between students’ academic and extracurricular achievements. It is aimed at providing future graduates with a more holistic set of skills and knowledge by achieving the required learning outcomes. These achievements are provided in the students’ graduation transcript.

Background
Taylor’s University developed the SHINE Portal by integrating an e-Learning system in the SHINE Award Programme; a voluntary programme which encourages student participation in 5 self-directed experiential journey, i.e. Voluntary Initiative, Leadership Commitment, Work Experience, Global Experience and Personal Development. The SHINE Portal system is an online tool for holistic development which manages, tracks, and recognises student participation and engagement in all approved on-campus and off-campus activities during their term of study at Taylor’s University.

The SHINE Portal was officially launched in September 2014. At the completion of its pilot run in December 2014, there were 300 users. Since then, this portal has been actively used by 3,698 users. The unique framework of the SHINE Portal was designed based on a sequential programme (“Series”) combined with four development areas (“Packages”) that was endorsed by 20 Top Employers. All students’ involvements are formally recognized through the 2nd Transcript, which complements the academic transcript. The 2nd Transcript validates students’ achievements and accredits outstanding performance in self-directed learning journey.

Product Design & Development
As mentioned above, the framework of SHINE Portal was designed based on a combination of “Series” and “Packages” (SNP). The following figures illustrates the said framework.

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The SHINE Portal provides users the ability to setup the values for the different series and learning packages (LP) in the SHINE Award Programme. The above framework has been endorsed by 20 Top Employers. This self-directed learning portal motivates students through the SHINE points and awards system. Students with high achievements are awarded with one of the 3 tier SHINE Award, which are the SHINE Silver Award, SHINE Gold Award, or the SHINE Platinum Award, based on the total points achieved. The SHINE Award and 2nd transcript, which validates and endorses the achievements of these students, are presented as certificates by the University during the annual Student Development Recognition Ceremony. Each certificate has a special security features for verification purposes.

Impact on Students of Higher Learning
As part of the university’s plan to provide a holistic education to Taylor’s students, the design of the SHINE Portal was closely integrated with the seven pillars of Taylor’s Graduate Capabilities (TGCs). Students registered for the SHINE Award Programme are required to undergo the Taylor’s Skill Assessment Test (TSAT). The skills chart as shown in a Spider Web graph will highlight students’ strengths and areas for improvement according to their own perceptions. As the TSAT is repeated at specified intervals, students’ perceptions are expected to change. Correspondingly, the graph changes as well. Students then use this graph to decide and plan on acquiring or improving the skills set(s), as required. Apart from the students’ academic transcript, the SHINE Portal provides support in generating a 2nd transcript to highlight the TGCs achievements by tracking and recognizing students’ participation in approved extra-curricular activities as well as capturing other activities that relate to life-long learning and emotional well-being. The 2nd transcript creates a unique value for each student as they set forth into a new phase of life with high hopes of seeking immediate employment in their areas of choice. Apart from high academic achievements, crucial skills such as problem-solving, communication, and critical thinking play a vital role to generate industry-preferred employees.

Consequent Impact on Community
With close to 35% of graduates unable to secure employment for six months following their graduation (Leo, 2018), it comes as no surprise that the importance of developing holistic education cannot be overstated. Of particular importance is instilling the realization amongst students to remain aware and be always prepared for challenges in the real world and immediate community.

The SHINE Portal creates various opportunities for students to become self-directed, evidence-oriented, and achievement-oriented. This gives students the opportunity to build their unique personal branding and portfolio for employment. This system acts as a tool that recognises students’ life-skills achievements, which plays an inevitably critical role during the process of employment.

The successful implementation of SHINE Portal can be easily gauged by the hiring of the SHINE Award recipients by top employers, locally and internationally. Among the employers are Hilti, KPMG Malaysia, KPMG Singapore, PwC, Schlumberger, Star Media Group, Veritas (Top Malaysia Architect Firm), Din Tai Fung (Won the 19th Malaysia Tourism Award 2014/2015) and Waldorf Astoria Ras Al Khaimah, Dubai.

Apart from personal branding, SHINE Portal is also used as an avenue for community projects such as cancer awareness campaigns and blood donations drives. This enables students to connect with the right channel for voluntary projects, globally. Students gain a powerful experience which positively impacts their learning and the communities they live in.

Impact on other Institutions of Higher Learning
The “Malaysian Education Blueprint 2015-2025 – Higher Education” (MEB-HE) issued by the Ministry of Education states that the first shift of the MEB-HE focuses on a holistic education system that develops entrepreneurial and balanced graduates (Ministry of Education 2013). The SHINE Award Programme, along with SHINE Portal and 2nd Transcript, meet

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the requirement towards achieving this first shift. This enables graduates to outperform most competitions during job interviews, globally. The SNP SHINE framework is the first of its kind in Southeast Asia.

Even during the early stage of implementation, other institutions of higher education in Malaysia such as University Utara Malaysia (UUM), University Malaysia Terengganu (UMT), University Technology Petronas (UTP), and Politeknik Mara had consulted the SHINE Award Centre on the SHINE Portal system with the intention to develop similar systems. Recently, the Lyceum of the Philippines Laguna (LPU) have sought expertise from the SHINE Award Centre with the intention of replicating the SNP SHINE framework and SHINE Portal for their institution.

Many institutions are in the process of developing holistic education and are seeking for a platform that verifies, validates and endorses students’ extracurricular achievements without compromising academic results and ensuring programme learning outcomes are met.

Acknowledgement
We would like to thank Deputy Vice-chancellor & Chief Academic Officer Professor Dr Pradeep Nair, Taylor’s University ICT team and our Portal Vendor PhiOrion for their endless effort to build this system.

References


SUSTAINING ACADEMIC EXCELLENCE WITH MICRO-CREDENTIALS AND DIGITAL BADGES

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Highlights:
This project aims to enhance and sustain academic excellence in the university through the Micro-Credentials and Digital Badges initiatives. The Digital Credential is introduced as part of the academic’s professional development programme that will recognize the participants skills and provide them with the opportunity to demonstrate their knowledge and skills earned through assessment-based activities. The participants will enrol in the training programme, apply what they have learned in the classroom and submit their learning evidence for Micro-credentials. Upon meeting all the requirements set for the Micro-credential, participants will be recognized through the digital badges awarded by university.

Keywords: academic training, digital credential, certification, performance-based assessment, digital badge.

Introduction
There is a constant need for the academics to keep upskilling themselves, especially when teaching with technology is concerned. One path for them to upgrade themselves is through the professional development (PD) programme organized by the University, however, in most cases these PD programmes do not have the mechanism to recognize the skills they have nor lead them to any certification. The existing certification programme, if any, will normally require the academics to complete series of modules to obtain certification. Academics now require credential that can be earned in days or weeks and most importantly, verified by the university.

Micro-credentials at Taylor’s University.
Taylor’s University is embracing the future with the transformation of its curriculum for degree and diploma programmes through the newly launched Taylor’s Curriculum Framework, an overhaul of the traditional curriculum which is crafted to enable students to be future-ready. A series of professional development programmes have been introduced to support the academics to prepare for the transformation. Micro-credential is introduced to bridge the gap on the skills acquired by the academics and prepare them for the new teaching and learning environment set through Taylor’s Curriculum Framework. It will equip academics with necessary skills and mind set in reforming their curriculum, i.e. to be relevant to the present generation of learners and be adaptive to changing trends in learning and society.

![Figure 1: Micro-credential Framework at Taylor’s University](image)

The Micro-credential framework (Figure 1) explains the stages that the academics need to go through to earn the Micro-credential. First, academics need to register and select the credential that he/she would like to apply. Then, equip themselves by exploring the relevant tools available. At this stage, academics have the choice of either to enroll into the online training modules, attend the blended training session or to self-learn the skills themselves. After acquiring the skills, they will then experiment it by applying it in the actual classroom and start to collect learning evidence based on the Micro-credential requirements, which include a reflection on what they have learned and observed in the classroom. The assessor will assess the submission, and upon meeting the Micro-credential requirements, a digital badge will be awarded to the successful academics. Once earned, the academics are able to share the digital badge on the social media.
Introducing Micro-credential as part of the professional development has surely benefited the academics. Their skills are recognized, and they will have the opportunity to demonstrate the knowledge and skills earned through assessment-based activities. This will make them stand out in comparison to the other colleague. The Micro-credential also provides the opportunity for the academics to continuously upgrade themselves. The byte-size interactive training modules developed as part of the Micro-credential initiative will offer training flexibility for the academics that will enable greater opportunities for self-directed learning, supported by mobile technologies for Just-In-Time easy reference.

Digital badges earned through this Micro-credential are online credentials that are shareable on social media networks. Academics are able to show skills learned and demonstrated through the completion of badge-specific criteria (Lim et al., 2018). Clicking on these digital badges will give information on the micro-credentials earned, the criteria that have been met and the institution issuing them. These badges to be used as a method of affirming student’s personal development and empowers badge earners to create their own learning experience, individually or collaboratively with other students (Glover, 2016).

The introduction of Micro-credential has enabled the academics to customize their own learning and set their own learning path. They are able to choose which credential they want to pursue, acquire the skills and most importantly get certified for the skills acquired. The byte-sized modules also offer the flexibility and enable learning to happen anytime, anywhere and anyhow, which in turn encourage academics to keep upgrading themselves for the 21st Century teaching. Therefore, it is critical for universities to develop a strategic micro-credentials implementation plan, and truly understand and value digital badges as the evidence of academics’ capabilities in their PD journal (Lim et al., 2018).

Acknowledgement
We would like to express our gratitude to Taylor’s University management for supporting and making this Micro-Credential project possible.

References
VIRTUAL REALITY: A LOOK INTO UKM FUTURE MEDICAL CLASSROOM

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Highlights: Virtual reality (VR) education is a new era of personalized learning. This technology is quite new and has a bright future in the education sector. It is the reason for the industry to embrace it, as it can be revolutionized in every sector. Virtual Reality (VR) UKM Future Medical Classroom is a classroom where medical students can learn and gain knowledge in a virtual environment. They have no boundaries in accessing the module developed using VR.

Keywords: virtual reality, learning, classroom, teaching, medical

Introduction
Virtual Reality (VR) is an active and constructive approach being widely used in various fields such as engineering, architectural and graphic design to name a few, as well as in medicine. It provides a great learning environment being developed to enhance students’ experience in terms of learning. VR has already given reason to the industry to embrace it, as it can be revolutionized in every sector. In regards to its novelty, it is first of its kind to be used in medical classroom in Malaysia.

Methodology
Medical students were recruited to have a hands-on experience on the virtual environment that has been developed. They were required to test on the technical aspect of the system and share their experience on how they would see it if it is being practiced in their curriculum. Satisfaction questionnaire was given to know the level of acceptance and room for improvement.

GeoVisionary is a software used to develop the environment in virtual reality. The software is able to visualize, analyze and interpret data in immersive virtual reality. GeoVisionary visually integrates terabytes of elevation and photography data covering a huge geographical area in real-time. GeoVisionary is highly scalable and is able to provide “fly-through” viewing of regional, national and continental-scale data sets in real-time at full speed. GeoVisionary has created a culture change in the way geoscientists visualize and interpret data and communicate their results by creating an intuitive virtual environment for them to operate in.

We developed the module using GeoVisionary software. The module consists of 3 systems which are organs, muscles and skeletal systems. Medical students can learn the anatomy using this VR system without having to use a cadaver. Each organ and muscle are labeled precisely. Students can separate each organ and can move around freely in the VR environment. They can see the texture and shape of the organ thoroughly.

Results
This VR classroom is thought to be able to increase students’ cognitive function. They are able to analyze learning content effectively and organized their way of thought. They can classify the information from the classroom faster. Within a limited time being in the classroom, students are able to identify important anatomies in the class using this VR classroom. Using this interactive teaching method, they became more responsive and actively participate in learning activities. In quiz session, they also became more competitive in their learning’s development. This VR classroom also teach them various use of ICT in enhancing their knowledge. They can engage in technological collaborative learning.

In department’s perspective, our department see that this VR classroom can improve students’ achievement and helps to achieve university’s vision and mission. Impact to the community, we can share the knowledge to others with no boundaries.

Conclusion
This virtual reality in context to medical teaching method has a great potential to be expand to cater the students’ need in learning.

Status of Innovation
This module already patented with Intellectual Property Number (IP NO.): LY2019000241

Acknowledgement
This innovation has collaborated with Integrasi Erat Sdn Bhd for module development and future commercialization.
References
DESIGN OF S. M. A. R. T. S - D4D, A MOBILE APPLICATION FOR DIETARY MONITORING AND MANAGEMENT AMONG END-STAGE RENAL DISEASE (ESRD) PATIENTS

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Highlights: Dietary monitoring and modification are vital components of treatment for End-stage Renal Disease (ESRD) patients who undergo haemodialysis to prevent disease progression and to manage symptoms. Generally, dietary management of ESRD requires adherence to strict dietary prescription, aimed at balancing the intake of certain important nutrients and fluid with biochemical markers and weight changes (Rebholz et al., 2019), which are very challenging for the patients. This paper presents the proposed design and feasibility analysis of a mobile application namely S. M. A. R. T. S – D4D app, which aims to enhance ESRD patient adherence to dietary restriction. It will be a patient-centred, convenient dietary and fluid self-management care, which enable monitoring by dietitians in charge of haemodialysis.

Keywords: S. M. A. R. T. S – D4D, haemodialysis, dietary adherence, mobile application

Introduction
End-stage renal disease (ESRD), now termed chronic kidney disease (CKD) stage five is a state of permanent loss of renal function defined as glomerular filtration rate of less than 15ml/min, which require haemodialysis procedure as the most common renal replacement therapy. Worldwide, the number of ESRD patients is growing rapidly in developed and developing countries, fueled by aging populations and a pandemic of chronic non-communicable diseases especially diabetes mellitus and hypertension. In Malaysia, the incidence and prevalence of patients with ESRD has been on an upward trend for the past 20 years (Bujang et al., 2017) and is expected to continue at an alarming rate. Survival wise, previous study pointed out that 9 – 13 % of patients who are on dialysis die within one year (Chandrashekar et al., 2014).

The all-cause mortality rate in hemodialysis patients is 6.3 – 8.2 times higher than the general population. One of the most common factors which affect the patient survival was failure in adhering to treatment regiments (Collins et al., 2012) which encompasses of an integration of multiple domains related to dialysis treatment, medication, fluid, and diet intake. However, implementing a complex dietary and fluid prescription is challenging for the patients. The typical daily dietary prescription for ESRD patients undergoing hemodialysis is 750 to 1L of fluid, not more than 2 g of sodium, 2 g of potassium, and 1 g of phosphorus. Also prescribed are a protein intake of 1.2 g per kg of body weight per day and a dietary energy intake of 35 kcal per kg of body weight per day (Fouque et al., 2007).

It is a common practice in most health facilities and hospital that dietitian play a major role in facilitating dietary and fluid prescription self-management using various educational materials such as brochures, fact sheets, lists of foods to avoid, referral to Internet sites and face to face counseling. Despite these efforts, patients continue to exhibit poor dietary adherence (Luis et al., 2016). In order to facilitate dietary and fluid self-management in daily living, dietitians are challenged to make information available at a time convenient for patients; provide information tailored to individual needs, cultures, and food preferences; and complement patient decision making with useful feedback (Welch et al., 2013). The S. M. A. R. T. S – D4D app aims to facilitate self-monitoring among patients and help dietitian to meet these challenges.

Content
Dietary monitoring and modification are vital components of treatment for End-stage Renal Disease (ESRD) patients who undergo haemodialysis to prevent disease progression and to manage symptoms. Generally, dietary management of ESRD requires adherence to strict dietary prescription, aiming at balancing the intake of certain important nutrients and fluid with biochemical markers and weight changes (Rebholz et al., 2019), which are very challenging for the patients. Thus, S. M. A. R. T. S – D4D mobile application is designed to enhance ESRD patient adherence to dietary restriction. This app will serve as a patient-centered dietary and fluid self-management, and also as monitoring tool for dietician.

The idea to develop S. M. A. R. T. S – D4D app was originated from dietician perspective, whereby the content of this app will be based on a handy manual previously produced entitled “Manual Diet Pesakit Dialisis”. The S. M. A. R. T. S – D4D representing the dietary strategy as shown in Figure 1.
Currently we are in the progress of conducting feasibility study to assess the practicality of the design as well as content validity of the proposed app development. This feasibility study involves dieticians and nurses in Kota Bharu, Kelantan. This abstract will present the proposed design and the findings from the feasibility analysis. There are three main modules / interface of this app; User Management module, Individual Plan module, and Nutritional Tips module.

The User Management Module
This module will encompasses of a Login screen. Each patient and dietician will have to register once for the first time to get a username and password. Once logged in, the profile of each patient will be displayed. The system will require the dietician to enter the nutritional assessment profile of patient based on four main assessments; anthropometrics (pre-dialysis weight, post-dialysis weight, inter-dialysis weight gain, dry weight and status), biochemical test will normal range (creatinine, urea, potassium, sodium, phosphate, ALP, uric acid, HbA1c, Alb, Hb, Calcium, cholesterol and etc.), clinical and dietary assessment (daily intakes of energy, protein source and calculation, source of phosphate intake, water and fluid intakes etc.). Once the patient’s profile is complete, a summary of assessment report, risk meter (high vs. low) and suggestion for action will be displayed based on the assessment findings.

The Individual Plan module
This second module will provide personalized dietary plan by which the recommended intakes of important nutrients related to hemodialysis (energy, protein, potassium, fluid etc.) will be automatically computed based on the report generated. This module will also consist of a virtual food diary to keep track and monitor the patients’ dietary and fluid intake.

Nutritional Tips module
This module will serve as the nutrition education platform for patients, family and caregivers as well as the public.

Dietary monitoring and modification are vital components of treatment for ESRD patient to prevent disease progression and to manage symptoms (Kosa et al., 2019). Generally, nutritional management of ESRD requires balancing the intake of energy and specific nutrients with biochemical markers and weight changes. Because of complex nutrition guidelines and consideration of coexisting conditions, dietary monitoring and modification can be significant and present daily challenges for these patients. It has been suggested in the literature that mobile health applications are promising vehicles to deliver health information and interventions to people living with chronic health conditions. Apps are accessible, convenient, and customizable. In addition, mobile apps also offer affordability, improved treatment compliance and potential to reduce barriers to seeking health care, such as stigma and discomfort. As regards to ESRD patient, mobile app offers the potential to assist them address unique challenges related to their individual diet. For example, to monitor and adhere to the nutritional recommendations provided by dietician, it is often advised to keep a food diary. This tool has its challenges; patients may forget to record a meal, have difficulty estimating serving sizes, or lack the time or ability to keep a diary. Moreover, previous study has highlighted that the patient preferred digital recording of food intake more than using pen and paper, as it saves time and resources (Franco et al., 2016).

This S. M. A. R. T. S – D4D app can become an excellent vehicle to educate patients as well as the public about chronic kidney disease in terms of treatment regimen, and dietary intake modification. It may also serve as a valuable tool to enhance awareness among the publics on the prevention of this disease nutritionally.
Although a mobile app would not replace the role of the dietician in assisting ESRD patients manage their dietary needs, this app offers potential to help health care providers overcome some of the potential barriers to consistent and optimal nutritional management, such as cost of dietician appointments, availability of dieticians and patients for frequent follow-up. It will also offer precise information regarding chronic kidney disease prevention, treatment and management to the public or caretakers and families from dietary point of view.

This S. M. A. R. T. S – D4D app is highly potential to be commercialized to reach the target users primarily the chronic kidney disease patients as well as healthy users who are health conscious.

Acknowledgement

We are grateful for the cooperation and expert views provided by dieticians and nurses who were involved in the feasibility study of S. M. A. R. T. S – D4D app development.

References


ATOMICFRENZY AR – FUN WITH CHEMICAL ELEMENTS USING
AUGMENTED REALITY

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Highlights: We created an augmented reality (AR) card game called ATOMICfrenzy AR. This created card game can help students to memorize important information in the periodic table of chemical elements. An interesting aspect about this card game is the use of the mnemonic technique to help students in improving their memory on the properties of selected chemical elements. The application of augmented reality in this card game makes the learning process more enjoyable. The results of this study showed that the percentage of achievement increased up to 10% after the students played with the ATOMICfrenzy AR for 10-15 minutes. 84% of them agreed that the ATOMICfrenzy AR was able to improve the skill of memorizing the important information in the periodic table of elements.

Keywords: Augmented Reality; Chemistry; Periodic Table; Mnemonic Technique

Introduction
Periodic table containing a very important information and one of the powerful icons in science where in a single document present chemical element in a systematic pattern. Most of the elements have been discovered during 18th and 19th centuries. Countless scientists had involved in arranging the elements in a good systematic classification which finally produces the current periodic table. The elements in the periodic table are a perfect mnemonic and a tool that famoulsy used to organize the whole of chemistry (Scerri, 2007). The periodic table not only permit chemists to analyse and understand the properties of each elements, it also helps to predict the properties of each element based on their position since the elements already place in a group. However, the presence of too much information in the periodic table is therefore difficult to memorize.

From the previous studies, several interactive learning tools in the learning of the periodic table have been reported (Alexander et al. 2008; Bayir 2014; Franco-Mariscal et al. 2016; Marti-Centelles & Rubio-Magnieto 2014). The interactive learning tools not only motivate and help the students to engage, it also stimulates higher order thinking, replicate phenomena accurately and speed up/slow time in order to provide relevant instructional experiences (Van Eck, 2006; Charsky & Ressler 2011). For this project, we developed ATOMICfrenzy AR, a combination of educational card game and AR technology to help the student in memorizing the important information in the periodic table of chemical elements in more effective and fun technique.

The main purpose of this project is to help students to memorize the important information in the periodic table of chemical elements. Besides, this project also aims to apply an effective and fun memorization techniques (AR and mnemonic) in enhancing the memorization skills in the learning process. The created ATOMICfrenzy AR is a combination of educational card, AR technology and online game. The front of the card contains information about element symbols, atomic numbers, physical states and element types while the back has information about the properties of elements in mnemonic diagrams. A total of 20 elements from 4 main groups (Group 1, 2, 17 and 18) that have been used the most in chemistry syllabus have been selected in this project. For AR technology, the front of the card has been provided with an additional information on the atomic structure of the atom while the back of the card provides the same mnemonic diagram but in more colorful form. This project is conducted as a class activity for KTT 112 Inorganic Chemistry I course for 1st year undergraduate Chemistry program at the School of Chemical Sciences, USM.

Features
The outstanding features of this innovation are (1) combination of learning techniques using AR, education card and online game (Kahoot) can make the learning process more effective and fun; (2) the use of mnemonic technique to help students in enhancing their memory on the properties of selected chemical elements; (3) a colorful cards and AR images create excitement in the learning process and (4) can be performed even without smartphone or internet facility as the incomplete cards are also included. The novelties of this innovation are (1) application of AR mnemonic images which we think so far there is no educational card available in the market using mnemonic techniques as an effective method of memorization and (2) application of difference color representing different elemental groups makes it easier for students to classify each element by their group. The benefits of this innovation are (1) helping students to memorize the important information in the periodic table more easier; (2) can be applied in secondary or tertiary education level for chemistry subject or in STEM program and (3) effective and fun learning tools for teachers and students or family fun activity.

There are 5 stages for this project. First, students are asked to answer the basic knowledge questions from without referring to any books or notes to identify their basic knowledge of the periodic table of chemical elements. Second, students are asked to play with ATOMICfrenzy AR in a group for 10 to 15 minutes. Third, students are asked to answer questions about the periodic table of elements as in ATOMICfrenzy AR using Kahoot. Fourth, students are asked to answer the same basic knowledge questions as the first stage to identify the students’ achievements before and
after playing with ATOMICfrenzy AR. Fifth, students were asked to provide feedback on ATOMICfrenzy AR via questionnaire and Padlets.

The analysis of basic questions form shows that there is an increase in the average of 2 questions correctly answered after 15 minutes playing with ATOMICfrenzy AR for 50 students (Figure 1). The results of the questionnaire analysis showed that 84% of the students agreed that ATOMICfrenzy AR helped them in memorizing the important information in the periodic table of chemical elements. In addition, 98% of the students agreed that the combination of AR card and online game is more fun. Response obtained from the Padlets shows that keywords such as ‘easy to memorize’, ‘attractive’, ‘fun’ and ‘helpful’ are mostly given by the students.

Figure 1: Score increment after using ATOMICfrenzy AR (based on the score obtained from the basic question form)

Acknowledgement
We wish to express special thanks to Centre for Development of Academic Excellence (CDAE), Universiti Sains Malaysia for the financial support.

References
A DIGITAL LEAP USING AUGMENTED REALITY (AR) IN RESTAURANT TRAINING: TRANSFORMING INTO THE AR-MENU

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Highlights: The purpose of this transformation is to explore the dining experience of consumers towards augmented reality (AR) integrated healthy dining menu in training restaurants. Focusing from the perspective innovative approach, AR integration within traditional restaurant menu enhances the research scope while incrementally increasing knowledge capacities and capabilities of 21st century students.

Keywords: Augmented Reality, Healthy dining menu, 21st century skills, restaurant sustainability

Introduction
Numerous studies conducted earlier have confirmed the present generation of consumers are more conscious to their own health; thus, healthful eating and grown interest on health and nutrition have become the attitudes of the consumer (Feiner, 1999; Baillot and Rosenblum, 2001a; Nam, DiSalvo, and Mendenhall, 2010). Consequently, to fulfill such need of consumers the restaurant sector is going through a paradigm shift, focusing more on the integration of more information and services in order to attract more consumers to their establishments. The emergence of augmented reality (AR) and ambient intelligence has unfastened a whole new pathway for restaurant sectors and motivated several research efforts to integrate the technological enrichments within the restaurant establishments. Hence, fostering augmented dining tables, menus, facilities and service delivery processes; such initiatives are aimed to entertain the guests, socialization during dinner, and informs about the health information to the consumers (Margetis et al., 2013). This shift of service delivery using AR towards consumers redefines the service experience and supplements the physical space of the establishments. While the research community largely agrees upon the adaptation of AR systems within the establishments in order to enhance the consumer experience, majority of restaurant business still lacking structural (tangible evidence and physical environment) and infrastructural resources [people, service delivery system, skills and knowledge].

The Innovation
The purpose of this innovation is to explore the dining experience of consumers towards augmented reality (AR) integrated healthy dining menu in training restaurants. Focusing on the perspective innovative approach, AR integration within traditional restaurant menu enhances the research scope while incrementally increases the knowledge capacities and capabilities of 21st-century students. It allows the students to apply their learning experience into the real-business environment for expanding their knowledge beyond the walls of the classroom. It provides an opportunity for students and educators to collaborate with industry to create new customer experience among competitors.

- Humanizing the technology to redesign the dining experience in the training restaurant.
- Bring the real business experience into the classroom.
- Increasing business and industrial revolution 4.0 Competence skills
- Bridging the curriculum and industry through humanizing the technology
- Develops the 21st-century skills among the students to become future-ready graduates.
- Bridging the curriculum and technology
- Creating new customer experience in the restaurant industry
- Showcasing the transformation of a menu with AR integration to the industry practitioners.
- Developing an AR app exclusively for the Malaysian market to create a healthy dining experience.
- Builds a stronger relationship with educator and industry practitioners globally
- Research cluster opportunities between other institutions and industry
- Collaborative with industry to create realistic/immersive dining space of eating with nutritional information

Acknowledgement
We are entirely grateful to the immense and continuous motivation from the Faculty of Social Sciences and Leisure Management, Centre of Research & Development for funding the ERGS funding and the intensive support from the eLearning (eLA) department of Taylor’s University.

References


I-TEST CAD
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Highlights: The purpose of this assessment innovation namely i-Test CAD is to improve the test assessment method to measure learning outcomes of CAD software use through e-learning. Two new features were developed namely “Paperless test question and answer” and “Quick initial test results”. The targeted groups are mechanical and manufacturing engineering undergraduate students. In the era of Industrial Revolution 4.0, i-Test CAD was designed by using e-learning to encourage paperless and sustainable environment. Through this assessment innovation, the learners’ attention is focused via online test assessment, initial performance is quickly evaluated, and a sustainable environment is created.

Keywords: Test, CAD, e-Learning, Paperless, Sustainability, Assessment.

Background of the innovation
Previous assessment method for learning outcome of CAD software in Engineering Drawing course is in the form of hardcopy test papers and it is quite costly. Thus, there are no opportunities for the learners and examiners to answer and evaluate respectively the paperless answer scripts, and to know the initial test results quickly. In addition, a lot of papers were required for preparing the test questions with its answer scripts, required massive collection and time consuming for conducting the test.

Description of the innovation
Therefore, an online test namely i-Test CAD for assessing the learning outcomes of CAD software is innovated for encouraging paperless and sustainability environment. The i-Test CAD is an abbreviation that stands for innovative-Test Computer Aided Design. i-Test CAD is introduced in order to improve the test assessment method for learning outcome of CAD software through e-learning. Two new features are developed namely “Paperless test question and answer” and “Quick initial test results”. The theoretical framework used is Outcome-based education (OBE). It is an educational theory that base on teaching and learning approach to achieve a goal by attaining a set of expected outcomes.

Important to education Since the previous assessment method for learning CAD software in Engineering Drawing course is no longer adequate for the assessment process especially in the era of Industrial Revolution 4.0, thus i-Test CAD is designed by using e-learning to attain these three objectives i.e. (i) to provide a platform where the paperless test question and answer scripts can be employed, (ii) to obtain the initial test results quickly, and (iii) to encourage paperless test for sustainability environment in the era of Industrial Revolution 4.0. The existence of i-Test CAD is in line with the university, national and international sustainable agendas i.e. (i) Universiti Sains Malaysia Accelerated Programme for Excellence (USM APEX) vision which is “Transforming Higher Education for a Sustainable Tomorrow”, (ii) Malaysian Education Blueprint 2015-2025 (Higher Education) and (iii) Sustainable Development Goals (SDGs). In addition, it is suit with the theme of International University Carnival on E-Learning (IUCEL) 2019 which is “Inspiring Innovations for Sustainable Futures”.

Advantages of the innovation
Through this assessment innovation, the advantages are i-Test CAD can grab the learners’ attention via online test assessment, evaluate their initial performance quickly, and encourage learners to work in sustainability environment. Consequently, the marking and grading can (i) be done online, (ii) be anywhere at any time, (iii) save a lot of time and paper, (iv) avoid to carry answer scripts and (v) avoid missing answer scripts. On top of that, cost for the test can also be reduced.

Commercial value
The targeted groups for i-Test CAD are mechanical and manufacturing engineering undergraduate students. However, it is also can be employed by the others who are really interested to encourage paperless assessment such as test, exam, etc for sustainability environment. Thus, i-Test CAD has a very high potential to be employed especially by higher learning institutions and training centres in term of marketability. It is also can attain a very high profitability and great impact.
Acknowledgement
The author would like to thank School of Mechanical Engineering, Centre for Development of Academic Excellence (CDAE) and Universiti Sains Malaysia for supporting this assessment innovation work and giving the opportunity to participate in the International University Carnival on E-Learning (IUCEL) 2019.
IMMERSIVE LEARNING THROUGH ROLE PLAYING IN BIOLOGY EDUCATION FOR PROMOTING SUSTAINABILITY

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Highlights: Studying biology is considered difficult and boring if read from textbooks. Biological mechanisms and pathways tend to involve complex concepts and processes that lead students to learn the material through memorization. Traditional teaching approaches therefore decrease their interest in understanding those topics. To address this problem, the present study intended to evaluate the effects of immersive learning through role playing to improve the teaching of biology and also to enhance the understanding of biological mechanisms and pathways. Results revealed that immersive role playing serves as useful way of communicating complex processes in plant systems and enables the learners to be completely immersed and visualize the whole process.

Keywords: Immersive learning, plant biology education, role playing, teaching innovation

Introduction

Biology is a unique discipline that provides knowledge of all forms of life. Student thinks biology lessons are boring, confusing or difficult if read from textbooks. Students’ difficulties in learning biology have been studied by various researchers from all around the world (Lazarowitz and Penso, 1992; Bahar et al., 1999). Many topics in biology, especially the cellular mechanisms and pathways tend to involve complex concepts and processes that lead the student to learn the materials through memorization.

This technique is not an effective approach and prevents meaningful learning. When you study biology, it is very important to visualize whatever you are studying. Students frequently have trouble visualizing what happens in a cell or systems. Experiencing difficulties in biology topics especially in plant biology subjects, negatively affects students’ motivation and preventing them from learning biology effectively. Students’ difficulties in understanding biology have encouraged researchers to investigate what are the reasons for difficulties and ways to overcome those obstacles.

There were many reasons have been identified in why students facing difficulties in learning plant biology subject. The uttermost important reasons were nature of science which overloaded with complex terminology and mechanisms and its teaching techniques (Cimer, 2007). Teaching biology topics in traditional way (face-to-face learning) may ignore students’ interests and expectations cause several learning problems as well as decreasing their interest in biology (Zeidan, 2010). Diminishing interest in learning science was due to lack of visualization and understanding of the mechanisms.

From the above review, there appears to be clear needs for further insight into improve the quality of biology teaching that encourage students, increase active participation and critical thinking rather than emphasizing role memorization of scientific concepts and facts. Therefore, the aim of the present study is to evaluate the effect of immersive learning through role playing to improve the biology teaching and also enhance the understanding of mechanisms that occurred in plant systems which is in-line with Generation Z students’ learning needs.

Research question

An important question concerning biology education is how to teach plant biological mechanisms and pathways without memorizing and through active learning approaches using immersive role playing that could promote sustainability.

Description of immersive role playing

As an initiative, we have developed a simple strategy using immersive learning through role playing technique for encouraging student involvement in learning of the plant biology subjects especially for their mechanisms and pathways. Role-play is defined as a product of ‘play’, ‘games’ and ‘simulation’, and in biology education this technique may be seen as an interaction between these three components (Harrison, 2018). This approach is a simple, inexpensive method for students to actively learn complex concepts while also developing cooperative social skills. Role-play enables learners to experience realistic examples of practices, behaviours and decision-making skills they need to be successful and confident in the desired role (Craciun, 2010). Realistic scenarios and characters provide a more interactive way to learn rather than the usual classroom-based learning. Alternatively, role-playing can be used to connect knowledge from classroom-based learning to true-to-life simulations (Randi and Carvalho, 2013).

Generally, in role plays the participants are telling a story that is enacted by the students who are given roles as the various pieces of background information. Challenges related to the story are then presented and must be
addressed by all participants. Each player represents a character in the story and is attributed skills (McSharry and Jones, 2000). Often, role playing is an active approach that tend to make concepts more memorable and understandable for students. Providing exposure to as many of the senses as possible, this technique includes multiple modes of learning: seeing, reading, hearing, and physical participation. This combination ultimately enhances learning of biology subjects.

Background of the innovation
Research design: With the increased focus on enhancing teaching and learning, inquiry about student learning has become primary concern in higher educations. The Scholarship of Teaching and Learning (SoTL) is an emerging movement of scholarly thought and action that draws on the mutual relationship between teaching and learning (Boyer, 1990). It is a systematic reflection and investigation of our classrooms. Out many SoTL models, I have adapted a model of Trigwell and Shale (2004) and modified to be used in my classroom. The SoTL research that have implemented includes five interrelated teaching components; i.e., Planning, modifying, assessing, reflection and sharing. The modifying element in the present study is innovative teaching strategies for plant biology subjects using immersive learning through role playing.

Participants: The participants were first year students of Bachelor Bioindustrial Science (BSBI) at Universiti Putra Malaysia Bintulu Sarawak Campus, Sarawak. The activity design for subject BGY3201 Plant Structure and Functions which involves studies on morphology, anatomy and biological mechanisms and pathways occurred in plants. There were total of 42 students age ranged 20-24 years old were participated in this activity. The demographic information of students is presented in Table 1.

Table 1: Demographic profile of respondents (n=42).

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>52.38</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>47.62</td>
</tr>
<tr>
<td>Previous background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matriculation</td>
<td>9</td>
<td>21.43</td>
</tr>
<tr>
<td>Diploma</td>
<td>29</td>
<td>69.05</td>
</tr>
<tr>
<td>STPM</td>
<td>4</td>
<td>9.52</td>
</tr>
</tbody>
</table>

Activities: Topics of photosynthesis was chosen to be carried out for this activity. The students were divided into three smaller groups. First group given a task for C3 photosynthesis, second group for C4 photosynthesis and CAM photosynthesis was carried out by third group. Short briefing was given to the students earlier on the topics and they have given enough time for prepare the props. During the role play, each step of the activity is enhanced for the students with an explanation of how each type of photosynthesis have been taking place in specific plants and how does it affects their adaptability in extreme environment or climate change.

Assessment: Without advance notice, ten multiple-choice questions were added through Kahoot at the end of the class. Additionally, short games using cards were played to test the students understanding on distinguish the differences between three types of photosynthesis pathways. Finally, the students also have been assessed on higher order thinking skill question in their finals examination.

Data collection and analysis: A survey based on Innovative Teaching Strategies Questionnaire (ITSQ) was conducted to obtain the students’ perception on the teaching innovation. The questionnaire used in this study contain 16 questions categories into 4 main factors; learnability, motivation, fun and usefulness. The students were assessed the questions with scale of 1–5. Scale 1 represent strongly disagree, Scale 2- disagree, Scale 3- Neutral, Scale 4-Agree and Scale 5= strongly agree. The responses to questions were analyzed quantitatively to identify descriptive statistics. Descriptive statistics were used to determine the frequencies as perceived by the students.

Important of role playing in education
In biology education, immersive learning through role playing can be seen as an interaction between play, game and simulations and the students that performs an activity with learning outcomes. Using this method, the teacher encourages the students to be intellectually and physically involved in the lesson content and that facility them understanding of difficult concepts. Through this innovative teaching approach, students are easily get visualize the process happened inside the plants without memorize the mechanism and pathways from textbooks.

Further, role playing also can help them become more interested and involved, not only learning about the material, but learning also to integrate the knowledge in action, by addressing problems, exploring alternatives, and seeking novel and creative solutions. Role playing is the best way to develop the skills of initiative, communication, problem solving, self-awareness, and team works, and these will help the younger generation to be prepared for dealing with the 21st century challenges.

Advantages of role playing

DeTAR Putra, Universiti Malaysia Sarawak
There are many advantages in learning biology through immersive role playing. Finding revealed, the students were not passive recipients of this immersive learning and the proposed teaching strategy has a positive impact on the performance of students’ diversity. The students’ reflection of the approached techniques using immersive role playing is presented in Figure 1. Students respond based on 16 questions were summaries into four main factors:

![Figure 1: Students’ reflection based on the applied innovative teaching method.](image)

including learnability, fun, motivation and usefulness. Generally, out of 42 students, 83.33% of them accept this immersive learning in biology with Scale 5. Approximately 88% of the students responded that this technique makes them visualize the pathway easily and able to understand the mechanisms clearly without memorization. This approach encourages the students to create their own reality where they designed their learning strategies. Learning through role playing become more effective because they defined effectiveness in learning as “retention of knowledge for a long time”, they expressed that teaching biology through simulation that helps them visualize and retain biological knowledge for a long time and thus remember or recall the information much more easily. Besides role playing approaches also increases student motivation to learn beyond the syllabus. Engage the students through this teaching technique make them self-confident in delivering the lessons and as a teacher we able to helps the students to identify and correct the misunderstanding. This motivate them to learnt the biology subject more effectively. Furthermore, students revealed that study biology is too boring. Biology lessons are generally carried out through teachers’ lectures and can be identified as teacher-centered lessons. In-line with this fact, the present approached using role playing in learning biology has attracted the students to learn in fun way. 95.24% of the students have responded that this innovative technique is fun while learning. Based on the observation, the students develop the ability to interact to others and they were energetic and enthusiastic in the classroom. When the assessment has been conducted using high order thinking skill questions, the students able to find detail information on the subjects and explain in detail on what they have learned.

Additionally, 88.10% students have responded that the present approach is also useful for them in learning the biology subjects. This strongly emphasizes that in learning materials or skills, students should be given extensive opportunities to manipulate the environment because, students’ cognitive structures will grow only when they initiate their own learning experiences. Therefore, teaching through immersive role playing may serve as an educational tool, giving students the chance to learn actively and potentially retain the acquired knowledge more efficiently.

References
QRDICE: INTERACTIVE DIGITAL LEARNING QUIZ PLATFORM USING QR CODE

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Highlights: QRDICE is a web based tool that allows educators and course creators to quickly create learning quizzes for any learning module and level of students. Various question types such as multiple-choice questions, true or false, match-the-following, and fill-in-the-blanks can be created and stored in the question bank. Imitating the dice games concept, the students need to toss the QRDICE, scan the QR Code on the dice by using the smart phone and answer the random quiz question appearing on the phone screen. A live scoreboard is available to motivate student to achieve high scores during the quiz games session.

Keywords: Interactive Learning, QR Codes in Education, Quizzing Tool

Introduction

Any learning experience, whether instructor-led or digital, cannot be completed without a quiz. While all educators and course creators know and agree about the importance of good quizzes, the variety of the interactive quiz platform is quite limited. In the race for more interactive tool, the software community has come up with a class of platform that help educators and course creator to author and compile questions into interactive learning quizzes, and share them easily with global audience. QRDICE, an interactive web based quizzing platform allows educators and course creators to quickly create learning quizzes for any learning module and level of students. To create an interactive and engaging quizzing session, QRDICE has been used as part of answering method in QRDICE. Originally created for industrial use, QR Code let students be active in their learning. At a minimum, it offer an interesting way to push information or contents to learners. At its best and most creative use, QR code can provide true interactivity and engagement, and that translates to more effective and enjoyable learning.

Description

One of the challenge in developing digital learning quiz platform is to verify the answer given by the students, especially if the question is an open ended question. There are four types of quiz questions that are suitable for digital quiz platform and able to measure whether the students are actually learning. The types of learning quiz question describes in Table 1.

Table 1: Types of learning quiz questions that are suitable for digital quiz platform

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Choice</td>
<td>Multiple choice questions are among the most effective ways to test learners on the content of online quizzes. They present several possible answers to a question, only one of which is right and the others being “distractors” meant to draw attention away from the real answer.</td>
</tr>
<tr>
<td>True or False</td>
<td>One of the easiest ways to frame questions is in true or false format. This type of question measures only low level of learning - remembering and understanding.</td>
</tr>
<tr>
<td>Fill in the Blank</td>
<td>Also called completion questions, no-hint fill-in-the-blank questions require that learners actually know the correct answer. This provides an excellent means for measuring specific knowledge, as it can reduce guessing by the students, and force them to supply the answer.</td>
</tr>
<tr>
<td>Matching</td>
<td>Matching, like fill-in-the-blank questions with hints, gives learners a little more to go on, and is therefore a good approach if more time given to students to absorb material.</td>
</tr>
</tbody>
</table>

To enhance interactivity element in answering the quizzes, traditional dice games concept is adapted in QRDICE with a little twist with the dice itself. Standard dice cube consists of six faces marked with a different number of dots from one to six. In QRDICE, the dots has been replaced with six unique QR Codes, which contains unique URLs that linked to different level of quiz questions. Six dice faces also representing six level of question based on six Bloom's Taxonomy level. The 6 levels of Bloom’s Taxonomy are Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. When the students are in the QRDICE game session, they need to toss the QRDICE, scan the QR Code on...
the dice and answer the random quiz questions appeared on the phone screen. Figure 1 describes overall work flow of the specific activities for each user role of QRdice.

Conclusion

There are a lot of online quizzing platform available on the Internet, but not many applying interactivity elements during the quizzing session. QRdice imitating the traditional dice games concept, where the student need to toss the QRdice, scan the QR Code and answer the random quiz question appeared on the smart phone screen. While the current platform is more focusing on the interactivity to support active learning, the future works of this project will include students’ learning log to support performance prediction.

Acknowledgement

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References


OTOMIND: SIMPLICITY OF THOUGHTS

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Highlights: OtoMind is a visual representation tool that allows users to generate a mind map based on keywords and key phrases automatically extracted from unlimited Wikipedia articles or PowerPoint presentation slides. This tool improves learning efficiency by self-organizing the source information, which saves time and effort among the users to understand a particular topic.

Keywords: text mining, keywords extraction, educational tool, keyphrase extraction, mind map.

Introduction
Visual representation tools are proven to significantly improve the studying efficiency among students. Among many, mind map is commonly used to represent ideas, words, task or set of items that can be arranged to link to a central concept or idea. A mind map can be utilized in a wide variety of ways in the education field ranging from knowledge organization, assessment testing, effective summary organization or student satisfactory evaluation in class. However, existing mind mapping tools only support constructing the structure of the mind maps but not the content. This project presents OtoMind, a mind map that supports teaching and helps the students in expanding memory recall as well as creating new environment for information processing. OtoMind capitalizes the Information Extraction technology, which enables automatic extraction of keywords and keyphrases from the original source and generate a corresponding mind map based on the terms extracted. OtoMind is able to robustly perform the extraction from unlimited pages of PowerPoint slides or from a Wikipedia site. The mind map generated is also enhanced with images for better readability and understanding among users. OtoMind is hoped to enhance student understanding by revealing complex relationships among the important concepts in a particular topic.

Content
OtoMind is a mind map generator that allows users to generate a mind map based on keywords and keyphrases extracted from Wikipedia articles or PowerPoint presentation slides. OtoMind is motivated by brain functions during learning where minds expand a concept through a central point, allowing users to engage their whole brain in to thinking and visualizing the big picture of a particular topic. This enhances the understanding process during teaching and learning. OtoMind brings both tangible and intangible benefits to the end users.

Tangible benefits:
- Save time and effort needed to understand the topic by learning from a mind map.
- Improve learning efficiency as the mind map works in line with our brain functions during processing information from words, images, logic to rhythm, color, spatial awareness and others.
- Help in arranging information to allow users to focus on the links and relationship between the ideas by linking the facts together.
- Able to condense a large amount of information into a single view while still maintaining the readability of the content.

Intangible benefits:
- Improve learning experience of the users.
- Increase user satisfaction in using the mind maps as they are not required to construct one.
- Allow the user to view the topic from a different perspective when users can view a large topic as one piece of information.
- Reduce the learning curve of learning new information.

Acknowledgement
We are grateful for Asia Pacific University of Technology and Innovation for sponsorship for this competition.
GENIUS
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Highlights: This project is essentially an e-learning platform combining active learning educational techniques to increase students’ study interest. Educators are able to share knowledge through forum panels and provide quizzes to improve and evaluate students understanding. There are various learning features implemented such as chatbot, flip cards, World Map quizzes, mini games, etc.

Keywords: E-Learning, education platform, active learning, stem module, chatbot, online quiz

Introduction
Nowadays, technology plays a significant role in all aspects of everyone’s life, for example, transportation, communication and business. Technology also has been used widely in the field of education in the form of PowerPoint, online books, and study resources. Active learning is a learning environment where the educators and students are actively engaged with the content through quiz, discussions, and activities. The emergence of active learning that provides educational programs has benefitted the society. For example, traditionally, students are required to prepare or revise on their own if they couldn’t attend the lecture, but with active learning, students can attend the lectures whenever they want.

Hence, this project is about an e-learning platform named ‘Genius’ which provides interesting education methods for primary school’s students and educators to use. This platform provides educational tools, resources for users, and most importantly they’re all based on active learning concepts such as interesting visual, brainstorming, games, and so on. Examples of these conceptual activities are map quiz, chatbot learning, sharing forum, and students’ leader board. It is believed that these activities are able to increase students’ interest in learning by using this platform.

Description
Learning passively has caused students to be less involved in learning experience. Students would prefer to conduct activities or study using electronic devices which can increase their interest in studying. Students would like to brainstorm a question and do their work with competitive mode instead of just reading and listening in class.

Educational institutes are continuously integrating new technologies with teaching practices and developing new combinations of information systems to support in teaching and learning. Technology provides a great opportunity to realize a vision of active learners engaged in fun, emotionally-driven experiences. Video games for example can provide story driven entertainment that engages kids to connect with the content while utilizing their critical thinking skills (Crocker, 2003). This method is known as active learning in which brain exercises are introduced in the classroom to encourage students’ thinking and participation in an effort to engage students in the learning process (Mitchell, Petter, & Harris, 2017). Studies (Table 1) have identified five categories related to active learning exercises and the benefits of each category.

Table 1: Benefits of Active learning in IS Exercises (Mitchell, Petter, & Harris, 2017)

<table>
<thead>
<tr>
<th>Category</th>
<th>Research Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Presentation</td>
<td>Increases information transmission</td>
</tr>
<tr>
<td></td>
<td>Increases student retention</td>
</tr>
<tr>
<td></td>
<td>Encourages student speaking</td>
</tr>
<tr>
<td>Collaborative Student Projects</td>
<td>Increases student knowledge</td>
</tr>
<tr>
<td></td>
<td>Encourages problem solving</td>
</tr>
<tr>
<td></td>
<td>Encourages critical thinking</td>
</tr>
<tr>
<td></td>
<td>Increases team skills</td>
</tr>
<tr>
<td>Technology Interaction</td>
<td>Increases student involvement</td>
</tr>
<tr>
<td></td>
<td>Illustrates technology benefits</td>
</tr>
<tr>
<td></td>
<td>Allows for out of class work</td>
</tr>
<tr>
<td>Assessment</td>
<td>Increases student preparation</td>
</tr>
<tr>
<td></td>
<td>Increases test performance</td>
</tr>
<tr>
<td>Games</td>
<td>Increases knowledge</td>
</tr>
<tr>
<td></td>
<td>Encourages active involvement</td>
</tr>
<tr>
<td></td>
<td>Allows for concept mastery</td>
</tr>
</tbody>
</table>
'Genius' is implemented as a game-based learning to enhance the learning strategies by involving active learning concept. It provides interactive and user-friendly interface for students which will make them to be more interested in using this system. 'Genius' will be developed for one Super Admin and two types of user account; educators and students. It will let educators to help out students by sharing knowledge with students through the sharing forum and provide quizzes for students. 'Genius' also provides different learning styles for students such as chatbot, flip cards, quizzes, mini-games, etc. The chatbot is like a virtual teacher where it will allow student to chat with and it will explain subject materials to students to read and learn. 'Genius' also provides a World Map Quiz for students to work on it. There are built-in questions and it also allows educators to add more questions into it. Students would have to answer questions correctly in every country to conquer the whole world. Their marks will be recorded in the leader board. It is believed that competitive mode will increase students' interest in learning. Alternatively, knowledge can also be obtained through sharing. This is why 'Genius' have a sharing forum for students and educators to share knowledge or ask questions. This sharing forum also encourages students who are shy to ask questions in class. We believe that these features will be able to activate students' divergent thinking, increases students' attention, and motivates discussions between them. This mode of thinking is able to increase students' ability to draw connections to the world, especially their own lives. Figure 1 summarises the functionalities of 'Genius'.

Our main objective is to enhance learning techniques by achieving active learning concept through online platform as students were not able to apply and analyse with their skills gained through passive learning. Students have more interest in learning via electronic devices and Internet. It is believed that by developing E-learning platform with active learning concept, it is able to help students to gain knowledge easier. In terms of time and money-wise, educators can effortlessly provide revision questions to students through this platform. Students and educators alike can share knowledge as well in this platform. Students also are able to apply their knowledge, problem solving skills, memory, and brainstorming skills on quizzes and games.

References
ZTECH DE OBJECT-ORIENTED COMPUTER GAME AS LEARNING TOOL FOR OBJECT-ORIENTED PROGRAMMING IN HIGHER EDUCATION INSTITUTION

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Keywords: Computer Game, learning programming, Object-oriented programming, Game-based learning, Computational thinking, higher education

Introduction
Object-oriented programming is a required fundamental skillset for all computer science or ICT students[1]. However, teaching object-oriented programming to undergraduate year one students is challenging and academics need to use different approaches to find suitable methods to enhance student understanding, self-interest and self-experimentation. This is because most of the Malaysia student without object-oriented programming concept prior enrols to any programming courses [2]. The proposed game is a simple role-playing game named ZTECH that motivates users to learn Object-Oriented programming in an easy and interaction environment. Players will play along the flow of each game quests and they will learn and pick up the object-oriented programming paradigm easily. A group of 60 students in the first year of Bachelor of Computer Science were offered to test out the game. The result obtained from the respondents show that more than 65% of the student agreed the proposed game to be efficient as learning tool to help them better understand the object-oriented programming paradigm. Thus the invention of this role-playing game is for those novice or beginner learners to learn object-oriented programming is necessary.

The classroom based learning and teaching methods are insufficient to support the learners or students especially learning programming related subject [3]. A game-based learning approach could be an efficient way for the students to learn object-oriented programming. Mainly because the empirical evidence that validates computer games are efficient tools for learning object-oriented programming is still absent from the literature [4]. Thus the objective of this project is to develop a propriety game-based learning game to learn object-oriented programming paradigm. In the proposed game, several relevant theories such as cognitive apprenticeship [5], self-determination theory [6], flow theory [7], ARCS theory of motivation[8], distributed practice [9], episodic memory [10], operand conditioning [11] and the taxonomy of intrinsic motivations for learning [12] are included to ensure the entire learning process is motivating and easy to learn.

ZTECH is a propriety game-based learning game that motivates student to learn Object-Oriented programming in an easy and interaction environment. Players will play along the flow of the program step-by-step and they will learn to grow their characters (ZTECH). To enhance the learning process, this game possesses an attractive storyline, pleasant game environment, nice and suitable sound effects, elegant character design and appealing animations. When the game starts, the main character will have the navigation system that allows it to travel around the game world, the game world is divided to 3 environments. In order to become stronger and more powerful, it has to fight with enemies who are the terrorists. By deflecting those enemies, player able to gain experience and gold. The purpose of the experience is for the level in order to gain more attack skill, while the use of money is for trading purpose with the in game trading shop. Some NPC will help the character by providing it with some missions and some of them are the guidance for the player which delivering the learning content to the player. Moreover, when the character finished the mission, it can earn rewards, either increasing experience or improving current abilities by obtaining new equipment. As the player are having fun with the game, they are actually learning the object-oriented knowledge. Besides that, ZTECH is a stand-alone game in which each player will play and learn in his or her own application. This is because saving function is provided with 5 saving slots. The game guides player to understand the concept of object-oriented. The gaming part aims to increase and foster users’ interest to learn the knowledge. The game provides users with all the basic object-oriented concepts like encapsulation, inheritance and polymorphism. In addition, the game includes some basic programming concepts which could improve users’ understanding. Five (5) game levels are featured with basic programming knowledge through 8 quests. With these features, ZTECH could be a catalyst to smoothen the path of learning object-oriented.

This game consists of 8 quests for the main character. First, the basic knowledge of object-oriented approach is introduced to players. They should pass through the first level after going through the objects and classes test. In level two, players are guided to learn about the control statement like if...else and switch... case as well as the structure of the method declaration. In the third level, the players are led to learn about the array and three types of looping statements. Quests are assigned to the players to ensure they comprehend the concepts behind the knowledge. By completing the quest, players can proceed to the next level. In the fourth level, players start to learn...
about the main principle of object-oriented. They are exposed to the concept of encapsulation and inheritance. Examples are provided to bolster their understanding. At last level, the game guides the players to learn about polymorphism principle. The game ends when players defeat the boss, called Virus. From time to time, players are rewarded for their learning enthusiasm, in which they are encouraged to continue to learn new knowledge and skills. In order to ensure the learning outcome can achieved via the gameplay and in game mechanic, it is necessary to align the learning content with game-based learning approach can be achieved by adapting Biggs’ [23] constructive alignment. There are two major ideas from constructive alignment, as shown below:

• how to get students engage in learning activities that are likely to enable them to attain intended outcomes
• how to set up a learning environment that supports the learning activities

In game-based learning perspective, the player is engaged in the game world, and searching it difficult to escape without learning what he or she is intended to learn [24]. According to Prensky [25], in order to achieve constructive alignment the intended learning outcome (observable behavior, degree of attainment and conditions of attainment) should be aligned to structural elements (rule, goal and feedback) of games proposed. Tables below are showing constructive alignment of intended LO and game elements of the proposed game.

Construction Alignment Sample

<table>
<thead>
<tr>
<th>Quest 1</th>
<th>Outcome of extraction and alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extracting components of LO</td>
<td>Observable behavior: Identify and remember …</td>
</tr>
<tr>
<td></td>
<td>Condition of attainment: … all basic object-oriented programming keywords …</td>
</tr>
<tr>
<td>Setting elements of game</td>
<td>Goal: Collecting the right programming keyword</td>
</tr>
<tr>
<td></td>
<td>Rules of play: … by collecting the right programming keywords, e.g. moving to the left and right; collect the required number of programming keywords</td>
</tr>
<tr>
<td></td>
<td>Feedback: Victory – show debrief that explains attainment</td>
</tr>
<tr>
<td></td>
<td>Mission fail – try again</td>
</tr>
<tr>
<td>Alignment of LO components &amp; game elements</td>
<td>Intended observable behavior that abide rules of play: moving avatar to right and left direction to collect the right programming keyword avoid incorrect keyword, if collect the wrong keyword, game end; player need to obtain 400 score</td>
</tr>
<tr>
<td></td>
<td>Victory debriefing: Collecting the required number of programming keywords can be achieved based on the speed of the player and the ability of recognition of the player.</td>
</tr>
</tbody>
</table>

Background of the innovation

Compared with other game for learning programming such as Alice 2D [13], Greenfoot [14], Darwin [15] and, CodeCombat [16], the proposed game focus on the game play and game mechanic to carry out the learning objective (no coding exercise type of game play needed). Player actually learning the object-oriented programming paradigm which without learning what he or she is intended to learn. Most of the existing games for learning programming are required coding practice type of game mechanics. For example, CodeCombat [17] required player to use script languages such as javascript, Lua, phyton as in order to progress through a small story or compete against other players. Alice is a 3-dimensional interactive animation program visualization environment. Novice programmer builds animated 3-D movies and authors‘ games at they learn introductory OOP concepts. The new version of Alice, Alice 3 will enable the typing of Java code to build Alice world [18]. Another example, Greenfoot [19] is an educational development environment highly specialized for the development of interactive, graphical application, it is based on Java programming. The use of text-based programming based on Java makes very sophisticated applications possible, matching students high expectations and prepare them for progression to more general programming environment [20]. Besides that, another example Darwin, is a game that features artificial intelligence creatures competing to either control a map or be the first to complete a task and it teaches
programming by creating creature in java [21]. Most of the programming game mentioned are required coding exercise, thus it is necessary to develop a propriety game-based learning games to learn Object-oriented programming.

Objective:
To reduce the complexity of learning object-oriented programming for first year computer science degree student to increase the efficiency of learning object-oriented programming via game-based learning approach to visualize objects in a role-playing game to increase the interaction between learners and the game.

Value Added:
Developed according to game-based learning approach, where adequate learning content is well structured with in-game mechanics. Feedback and responses are presented to the learner via appropriate dialogues. 8 puzzle quests are provided to construct efficient learning experience for the learner.

Usefulness
increase learner interest, courage, and determination in learning and understanding object-oriented programming suitable for novice learners whose first time learning object-oriented programming no syntax memorizing and coding exercises required
Linking learners’ interest and motivation to the game-based learning context

Key features of ZTech de Object-Oriented
- Learning Object-Oriented Programming concept in fun and effective way
- no programming or coding background needed
- interactive and interesting game story
- fun and challenging mini puzzles
- can play and learn any time

The impact of this game toward teaching and learning:
- foster and gain interest toward learning object-oriented programming
- able to overcome the learning obstacles
- learners can decide their own learning pace

The prototype of the game will be available for free download from Google Drive however there will be advertisement attached to it. The beta version of this game will be bundle as part of the learning tool for any university which offering computer science programmes.

Acknowledgement
This study has been supported financially and technically by KDU University College, Sultan Idris Education University and Taylors University Malaysia. The researcher would like to extend the gratitude to all the parties that participated in this study.

References
ODYSSEY OF PHOENIX COMPUTER GAME AS LEARNING TOOL FOR OBJECT-ORIENTED PROGRAMMING IN HIGHER EDUCATION INSTITUTION

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Introduction

Object-oriented programming is a required fundamental skillset demand by the IT industry for all computer science or ICT students (Brinda, Kramer, Ruf, 2015). However, teaching object-oriented programming to undergraduate students is challenging. Besides that, academics need to find a different approach to improve student understanding towards object-oriented programming. The proposed game is a 2D role-playing game named Odyssey of Phoenix (OOP) that leads students to learn object-oriented programming in an easy and interactive way. Students will play along the flow of each game world and they easily will learn and pick up the object-oriented programming paradigm by completing the required tasks. A group of 10 students in the second year of Bachelor of Game Development at KDU University College were offered to participate a pilot testing to evaluate the game. Thus, the invention of this role-playing game is necessary for novice or beginner learners understand object-oriented programming (Wong, Yatim, Tan, 2014). The paper and chalk based teaching method and lectures learning centred approach are insufficient to support students, especially learning programming related subject (Rais, Elyiana, Sulaiman, Syed-Mohamed, 2011). A game-based learning approach could be an efficient way for the students to learn object-oriented programming, mainly because the empirical evidence that validates computer games as efficient tools for learning object-oriented programming is still absent from the literature (Wong, Yatim, Tan, 2014). Therefore the aim of this paper is to discuss the development of game-based learning game (2D role-playing) to learn object-oriented programming paradigm.

The Proposed Computer Game

The proposed game is developed according to the game-based learning design approach model, where several relevant theories, such as condition of learn, operant conditioning, constructive, hierarchy of needs and bloom taxonomy are included to ensure that the entire learning process is motivating and easy to learn. The game-based learning design model is divided to three layers, such as presentation layer, learning theory layer and core game-play layer. Each layer covers a different expect, where focus is on how to make the learning environment more effective for player to learn object-oriented programming. The proposed game is a role-playing game named Odyssey of Phoenix that motivates users to learn object-oriented programming in an easy and interactive environment. Players will play along the flow of each game and they will easily learn and pick up the object-oriented programming paradigm. Players are not required to have any coding practice and learn via the provided game-play with pseudo code support. A group of 20 students in the second year of Bachelor of Computer Science were offered to participate a pilot testing to evaluate the game. The respondents showed positive results, where most students agreed that the proposed game is efficient as a learning tool to help them understand the object-oriented programming paradigm better. Thus, the invention of this role-playing game for novice or beginner learners to learn object-oriented programming is necessary.

The Odyssey of Phoenix implemented the concept of Role-Playing in the game to make it more exciting and engaging. OOP is the first mobile game that learns object-oriented programming without any coding exercises. Besides, all the game assets used are self-drawn 2-Dimension to give a sense of immersive learning. The player can travel from an area to another by clicking on the area icons. Besides that, the provided user interfaces are designed based on the mobile design approach to make the player have easy- to- use interface while playing the game. The area name will be shown at the middle top screen when selected. Besides that, the area associated with tasks have

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word quest appearing underneath the area icon. The major areas are 3 jetties, Crystal Cave, Abandoned Warehouse, Bandit Cave, Underground Min, and Bandit Cave.

In order to ensure the learning outcome can be achieved via the gameplay and in game mechanics, it is necessary to align the learning outcomes and in game mechanics appropriately. The proposed game is adapting Biggs’ constructive alignment (Bigg’s, 1996) to align the gameplay with learning outcomes.

There are two major ideas from constructive alignment from Bigg’s (Bigg’s, 1996) are shown below:

• how to get students engage in learning activities that are likely to enable them to attain intended outcomes
• how to set up a learning environment that supports the learning activities

According to Prensky (2007), in order to achieve constructive alignment, the intended learning outcomes (observable behaviour, degree of attainment and conditions of attainment) should be aligned to structural elements (rule, goal and feedback) of games proposed. Tables below show the constructive alignment of intended Learning Outcomes and game elements of the proposed game.

![Image of in-game class structure in pseudo code and class hierarchy](image)

**Figure 1.0 In-game Class Structure in Pseudo code and Class Hierarchy**

<table>
<thead>
<tr>
<th>Quest 2</th>
<th>Outcome of extraction and alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extracting components of Learning Outcome</td>
<td>Observable behaviour: Understand class creation with inheritance hierarchy structure ...</td>
</tr>
<tr>
<td></td>
<td>Condition of attainment: ... that include attribute, constructors and methods ...</td>
</tr>
<tr>
<td></td>
<td>Degree of Attainment: ... to understand all the class structure in pseudo code</td>
</tr>
<tr>
<td>Setting elements of game</td>
<td>Goal: Complete the hierarchy chart</td>
</tr>
<tr>
<td></td>
<td>Rules of play: ... by completing all the required parts, e.g. collect required material;</td>
</tr>
<tr>
<td></td>
<td>Feedback: Victory – show debrief that explains attainment Mission fail – try again</td>
</tr>
<tr>
<td>Alignment of Learning Outcome components &amp; game elements</td>
<td>Intended observable behaviour that abide rules of play: obtain and analysing the given class and the inheritance hierarchy structure defeat the enemies to obtain the required material fail to defeat the enemies will result to minus the avatar health point</td>
</tr>
<tr>
<td></td>
<td>Victory debriefing: Collect all the parts successfully can be achieved based on the ability of the player to collect the right amount of material by defeating all the enemies</td>
</tr>
</tbody>
</table>

**Table 1.0 Constructive Alignment 1**

**Background of the innovation**

Most existing games to learn programming, such as Alice 2D, Greenfoot, and CodeCombat, require students to play with programming coding exercises (Wong, Yatim, Tan, 2016). However, the proposed game-based learning game focuses on the game play and game mechanics to carry out the learning objective, where no coding exercise type of game play is needed. For example, CodeCombat (Vahldick, Mendes, Marcelino, 2014) requires a player to use script languages, such as JavaScript, Lua, and phyton, in order to progress through a small story or compete against other players.
For the second example, Alice is a 3-dimensional interactive animation program visualisation environment that will enable the typing of Java code to build Alice world (Vahlckick, Mendes, Marcelino, 2014).

Meanwhile, Greenfoot (Mullins, Conlon, 2008) is an educational development environment based on Java programming, where the use of text-based programming based on Java makes very sophisticated applications possible, matching students high expectations and preparing them for progression into a more general programming environment (Kolling, 2012).

Most of the programming game mentioned require coding exercises, thus it is necessary to develop propriety game-based learning games to learn object-oriented programming without coding exercises.

**Importance to education.**

**Objective:**
- to reduce the complexity of learning object-oriented programming for first year computer science degree student
- to increase the efficiency of learning object-oriented programming via game-based learning approach
- to visualize objects in a role-playing game to increase the interaction between learners and the game

**Value Added:**
- Developed according to game-based learning approach, where adequate learning content is well structured with in-game mechanics.
- Feedback and responses are presented to the learner via appropriate dialogues.
- 8 puzzle quests are provided to construct efficient learning experience for the learner.
Usefulness
- increase learner interest, courage, and determination in learning and understanding object-oriented programming
- suitable for novice learners whose first time learning object-oriented programming
- no syntax memorizing and coding exercises required
- Linking learners’ interest and motivation to the game-based learning context

Advantages of the innovation

Odyssey of Phoenix is the first mobile game that is designed through a cooperation between computer science professionals and game developers for university student to learn the importance of object-oriented programming paradigm that highly demanded in IT industry. This game contains two game worlds with several challenging and interesting quests (for each game world) which reflect the consequences of decisions made by the student when overcoming in-game challenges and completing in-game quests. The mobile game is designed for them to learn object-oriented programming paradigm such as class, object, encapsulation, inheritance and polymorphism. The unique mechanics of Odyssey of Phoenix (OOP) allows players who played the game can learn object-oriented programming paradigm via the game play without any coding or syntax exercises.

Odyssey of Phoenix (OOP) can be played by university student aged between 18 and 22 years old to acquire knowledge and intellectual skills related to object-oriented programming and the important of this programming paradigm as well as improving their computational thinking. Lecturers and tutors from IPTA or IPTS can use the game as teaching and learning tools to help their student understand the OOP content and the learning objective easily. The in-game challenges and quests can be used to direct students to establish the concept of object-oriented programming effectively. With the use of mobile game, less paper-based training materials would be needed for learning object-oriented programming, thus reducing the consumption of papers. Besides that, this mobile game also can reduce the electronic waste as well.

Commercial value

Odyssey of Phoenix (OOP) is published at Google Play Store and it can be downloaded for free. The full version will be published at Google Play Store and Apply App store for USD0.99, in which it is distributed throughout the world. Players can play the game on tablets or smartphones. In terms of marketing, the game will be featured in a game-based learning portal can play the game on tablets or smartphones. In terms of marketing, the game will be featured in a game-based learning portal.

Acknowledgement

This study has been supported financially and technically by KDU University College, Sultan Idris Education University and Tylors University Malaysia. The researcher would like to extend the gratitude to all the parties that participated in this study.

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HATI BUDDYGAMES: MICRO + PUZZLE LEARNING ENHANCING KNOWLEDGE OF TYPE OF BULLYING AMONGST STUDENT

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Abstract: Hati Buddy Games: Micro + Puzzle learning aims to address the bully phenomenon in school by enhancing the students’ knowledge of bullying through a combination of game based learning with micro learning videos on a website. The combination of this approach is implemented using QR code technology. In this game, students who successfully match the puzzle cube will get a QR code for the micro learning website. Through this website, micro learning about the knowledge of bullying types is shown to enhance understanding. Online quizzes are provided to test their understanding before they match the next puzzle cubes.

Keywords: Game based learning, Micro learning, Bully behaviour.

Like any other countries, bullying in Malaysia happens mostly in schools, among the Malaysian school students. According to Yaakub, Haron and Goh (2010), bullying cases among the Malaysian students have been increasing. Bullying is categorised as direct bullying and indirect bullying (Khalim, 2014). Direct bullying are hitting, kicking, punching, threatening, slapping, pulling or pinching whereas indirect bullying involves verbal insults and teasing which affects the victims psychologically and emotionally. Unfortunately, the study found that the level of knowledge about bullying among school children are at a low level. Therefore, there should be efforts to increase the knowledge and understanding of bullying among students.

Hati Buddy Game: Micro + Puzzle learning is one of the activities in the 2Bs Program: I’m a Buddy not a Bully. The program aims to address bullying phenomenon in schools by increasing knowledge and awareness about bullying among students. Studies have shown that pupils have low levels of knowledge about bullying behaviour, particularly with regard to bullying types. A low level of knowledge about bullying behaviour has a significant correlation with the level of bullying behaviour.

As such, Buddy’s Heart game: Micro + Puzzle learning emphasizes on improving student knowledge about the types of bullying behaviour. This game is a combination of game based learning approach with micro learning. Game based learning method applies Puzzle cube picture about bully types while micro learning is based on videos in a special website. This short video provides explanations and examples related to the image matching activity of bullying behaviour in the puzzle cube. The combination of this approach is implemented using QR code technology. This game requires students to match puzzle cubes based on pictures of bully types. Once successful, it will obtain a QR code for a micro learning website that contains short video descriptions related to the knowledge of the types of bullying. Through video and website, students will know the definitions, examples and ways to avoid being bullied according to the type of bullying. In addition, an online quiz is implemented to test the mastery of the students before they complete the next puzzle cubes. There are six different pictures according to the type of bullying. This game is more exciting implement in groups with the added elements of competition and fun.

Experimental research to test effectiveness has been carried out in several primary schools in Penang found the game Buddy Heart: This Micro + Puzzle learning has successfully improved student knowledge about the types of bullying behaviour effectively. Indirectly raises student awareness about the types of bullying behaviour. A total of 340 students have been involved in this experimental study in which they were divided into a control group and a treatment according to the school. Observation and interviews also found that in addition to improving the knowledge about bullying this game has also attracted attention and increased their motivation towards the activity being carried out instead of the lecture method.

The game targets pupils as well as teachers, counsellors, warden and school administrators and bodies involved in school discipline management. Buddy Heart Program: I’m a Buddy not a Bully, contains four modules and includes the Heart Buddy game: Micro + Puzzle learning. The game provides modules and tools for activities, to facilitate learning effectively. Through the knowledge of bullying acquired by students, it will indirectly help prevent or reduce bullying cases that occur in schools and create a conducive and safe learning environment.

References

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AL-HIJAEI V1
(MODEL PEMBELAJARAN ALQURAN BERASASKAN PH2-PSYCO)

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Pengenalan

Pengenalan
Al Hijaei adalah satu model yang mempunyai keahlian pendekatannya yang tersendir, sesuai untuk semua golongan disabiliti. Al Hijaei juga boleh dipergunakan disekolah-sekolah KAJANG, sekolah khas, sekolah khusus, sekolah khas dan sekolah khas. Al Hijaei juga boleh digunakan sebagai bahan pengajaran bagi program JQAF di sekolah-sekolah di Malaysia dan dapat membantu pelajar serta menarik minat utk belajar membaca alQuran dalam konteks dalam negara kita. Al Hijaei boleh membantu 1.6 Billion ummah islam serata dunia untuk belajar membaca alQuran melalui produk Al Hijaei Online dan Al Hijaei App. Jika diamati, sebanyak 257 negara di dunia bukan penutur jati bahasa Arab, dengan demikian, Al Hijaei berusaha untuk melebarkannya ke seluruh dunia dan mengharap semua ummah islam boleh mengambil manfaat dari Model Al Hijaei ini sebagai keahlian asas bacaan alQuran.


Kata Kunci: alHijaei, kaedah pembelajaran alQuran, metode Lulu

Penutup
Al Hijaei adalah satu model yang mempunyai keahlian pendekatannya yang tersendir, sesuai untuk semua golongan disabiliti. Al Hijaei juga boleh dipergunakan disekolah-sekolah KAJANG, sekolah khas, sekolah khas dan sekolah khas. Al Hijaei juga boleh digunakan sebagai bahan pengajaran bagi program JQAF di sekolah-sekolah di Malaysia dan dapat membantu pelajar serta menarik minat utk belajar membaca alQuran dalam konteks dalam negara kita. Al Hijaei boleh membantu 1.6 Billion ummah islam serata dunia untuk belajar membaca alQuran melalui produk Al Hijaei Online dan Al Hijaei App. Jika diamati, sebanyak 257 negara di dunia bukan penutur jati bahasa Arab, dengan demikian, Al Hijaei berusaha untuk melebarkannya ke seluruh dunia dan mengharap semua ummah islam boleh mengambil manfaat dari Model Al Hijaei ini sebagai keahlian asas bacaan alQuran.

Pembangunan Alhijaei

Berikut adalah fasa-fasa yang terlibat dalam pembangunan AlHijaei:

- Fasa 1: Pengumpulan Maklumat
- Fasa 2: Pembinaan Konsep dan Prototaip
- Fasa 3: Uji kaji Produk dan Penambahbaikan
- Fasa 4: Pengesahan Pakar
- Fasa 5: Pendaftaran Hak Cipta dan Pengkomersilan

FASA SETERUSNYA

Pendaftaran Cop Dagangan
Promosi / Showcase
Penyelidikan dan Pembangunan (R&D)

Kepentingan Terhadap Pendidikan:

Sebagai seorang muslim, membaca Alquran adalah salah satu amalan yang wajib, ini kerana setiap muslim mesti manjalinan tanggungjawab individu seperti solat, puasa, zakat dan sebagainya, sesungguhnya solat merupakan tiang asas kepada semua amalan seseorang individu muslim, maka tidak sah solat seseorang individu muslim sekiranya tidak membaca ayat Alquran dalam solatnya.

Kelebihan Inovasi:

Inovasi ini mempunyai keunikan dan asli. Bercirikan mudah, cepat dan jimat berasaskan ph2 Psycho, manakala presentasinya sangat menarik melalui susunan pembentukan AlHijaei yang memainkan peranan warna. Ianya sangat sesuai bagi golongan yang ingin belajar membaca AlQuran dari kalangan dewa sa, muallaf, kanak-kanak setahun, kanak-kanak istimewa (sindrom down, autism dan slow learner). Selain itu, ia manfaat menarik minat mereka yang tidak minat mempelajari AlQuran dan merasakan bahawa ianya susah.

Nilai Pekomersialan:

AlQuran adalah kitab panduan setiap individu muslim di dunia ini. Masyarakat muslim telah meningkat setiap tahun, 1/3 penduduk dunia adalah beragama islam, dengan demikian kepentingan AlQuran dalam kalangan masyarakat islam amatlah tinggi untuk tujuan ibadah terutama solat. Alhijaei adalah satu model yang boleh menjadi option pengguna Islam untuk mempelajari AlQuran.

Rujukan:

AlQuran, Rasm Uthmaniy
Asha'ul Humam, Kaedah Bacaan AlQuran IQRA', Yogjakarta, Indonesia.
Ibn Jinni: „Uthman bin Jinni: [f.t]}, Al-Khassa:”s. [t.tp]; al-Maktabat al-'Ilmiyyat.
A FUZZY LEARNERS’ KNOWLEDGE MODELLING SYSTEM FOR ONLINE LEARNING

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Highlights: Many past studies report on personalising learning via intelligent systems but only a handful report on assisting instructors in personalising learning by leveraging technology. Instructors are knowledgeable in teaching and learning but they seldom put much effort to personalise learning due to the complexity of this approach. This study presents a fuzzy learners’ knowledge modelling system that addresses three issues related to the complexity of personalising learning. This study also demonstrates how this system can be applied in a real-world scenario. The case study shows that based on learners’ performance in online assessments, this system is able to assist instructors to personalise learning by planning for appropriate interventions through the insights derived from the system.

Keywords: personalised learning, assessments, fuzzy logic, fuzzy inference system, learners’ knowledge modelling system, performance reporting

Introduction
In the field of education, the emergence of technologies raises opportunities and challenges in personalised learning. However, due to the complexities of personalising learning, instructors who are knowledgeable in teaching and learning shy away from personalising learning (Curtin University, 2016). This study presents a fuzzy learners’ knowledge modelling system that is able to minimise the complexity of personalising learning via technology leverage, in order to encourage and assist instructors in personalising learning. To fulfil this objective, design and development of the proposed system revolves around three issues related to personalise learning.

First issue is about how the proposed system is able to integrate with the present curriculum. According to NMC 2016 Horizon Report (Johnson et al., 2016), the use of technologies in personalising learning without such consideration can lead to increased needs of training sessions to ensure instructors can effectively personalise learning via technological assistance. Thus, the proposed system is designed to be able to decompose the instructors’ knowledge based on the present curriculum. In addition, the proposed system is designed to record learners’ knowledge as a subset of the instructor’s knowledge. Via such design, the proposed system is able to report the learners’ knowledge level of the present curriculum.

Second issue is about how to determine learners’ knowledge that is lexically imprecise. Instructors tend to determine learners’ knowledge based on their assessment results. However, determining what the learners had learned is not as direct as measuring the number of correct answers that the learners performed in the assessments (Jeremić, Jovanović, & Gašević, 2012). The reasoning of the learners’ knowledge can also be influenced by imprecise factors. For example, DEPTHS (Jeremić et al., 2012) involves the difficulty of answering the assessment questions as a factor in knowledge reasoning. Hence, a fuzzy inference system is embedded into the proposed system to provide reasoning of learners’ knowledge. This is because fuzzy inference system can mathematically deal with uncertainties (Asopa, Asopa, Joshi, & Mathur, 2016). This fuzzy inference system is designed to be able to capture learners’ knowledge based on their assessment results and other imprecise factors, such as the difficulty level of answering the assessment questions that might influence the knowledge reasoning.

Third issue is about how to examine each and every learner’s knowledge, especially in a large class. This is due to the need to understand each individual learner’s knowledge for planning appropriate interventions to personalise their learning (Volarić, Vasić, & Brajković, 2017). However, such a process is difficult and burdening to the instructors without technological assistance, particularly with a huge group of learners. Learning analytics is gaining its prominence in supporting the feasibility of personalising learning among a huge group of learners (Johnson et al., 2016; Ruipérez-Valiente, Muñoz-Merino, Leony, & Delgado Kloos, 2015; Spector, 2018). Learning analytics is an emerging technology for capturing, analysing, and reporting any data about the learners and the learning environment (Adams Becker et al., 2017; Suthers & Verbret, 2013). Hence, the learning analytics approach is utilised in the proposed system, so that it is able to report the knowledge of a group of learners as well as an individual learner.

Methods
In order to demonstrate the applicability of the proposed system, a real-world case study was conducted in cooperation with an undergraduate instructor. During the semester where this case study was conducted, the instructor conducted weekly lectures. After several lectures, the instructors tested the learners’ knowledge via online assessments. A benefit of conducting online assessments is that learners’ assessment results are computed by the
online tools right after they completed the assessments. This can reduce the instructor’s workload in marking and grading all learners’ assessment performance.

The required data for this case study were collected from the instructor through questionnaire. After collecting the data, data pre-processing was conducted. For this case study, the data pre-processing began with tabulating the collected data and then checking for any missing values. Next, the collected data was exported in Comma-Separated values format for inputting purpose. Subsequently, the collected data was inputted to the proposed system. The fuzzy inference system that was embedded in the proposed system then reasoned the learners’ knowledge based on the collected data. Learners’ knowledge was categorised into seven knowledge levels that indicated their online learning performance. Then, the proposed system modelled and reported the fuzzily reasoned learners’ knowledge based on the present curriculum. The reports of learners’ knowledge were generated via learning analytics approach and presented to the instructor in visualisation form. The purpose of presenting reports in visualisation form is to ease the interpretation and comprehensibility of the reports. Moreover, visualisations can provide more explicit and meaningful insights to the instructor and assist him or her to produce appropriate interpretations based on his or her teaching experiences as well as understanding about the course and learners.

Results and Discussion

The case study demonstrates how the proposed system can be an assistant to the instructor in a real-world scenario. It shows that the proposed system has the capabilities to reason, model, and report learners’ online learning performance based on the inputs provided by the instructor. Moreover, the proposed system is able to generate and present reports of the learners’ knowledge in various aspects, such as the learning performance of an individual student in comparison of the average learning performance of whole class. These generated reports on the students’ learning performance can support the instructor in examining the learning performance of either a group of students or an individual student. By referring to these generated reports, the instructor can plan for appropriate interventions to improve the learning performance of the students.

Conclusion

This study presents a fuzzy learners’ knowledge modelling system that assist instructors in personalising learning. The proposed system demonstrates its capabilities in informing the appropriateness of the instructor’s practice and assisting them to plan for interventions to personalise learning. Moreover, the proposed system is able to integrate with the present curriculum. Hence, institutions that employ the proposed system will be able to implement personalised learning without high dependency on infrastructure, facilities, and technical support. To support large-scale implementation of the proposed system at the institution level, further studies on the usability, scalability, sustainability and accessibility of the proposed system are recommended.

In addition, this study can be a reference for future studies on modelling learners’ knowledge and personalising learning. This study presents various related issues in designing and developing a system that can reason, model and report learners’ knowledge. This study also demonstrates how the proposed system can help the instructors in examining the learners’ knowledge by leveraging learning analytics.

Acknowledgement

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References


PROJECT ADEPT: ONLINE PLATFORMS TO IMPROVE PROFESSIONAL DEVELOPMENT

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Highlights: Project ADEPT was undertaken to develop online platforms to improve productivity among staff in both teaching and learning, and in academic development. The ELITEOnline system is a learning portal that enables staff to acquire training online, learn at their own pace and time in a MOOC-style approach. The ACCOnline system supports curriculum change reviews within the faculties to enable OBE-driven syllabus reviews to be expedited. Both systems are underpinned by the MMU Teaching & Learning framework that aligns OBE with teaching and learning methods, and were effective in improving staff development at academic, and teaching and learning levels.

Keywords: Staff development, Curriculum Design, Training, MOOC, Teaching & Learning, OBE

Introduction
The Malaysian Education Blueprint (Higher Education) 2015-2025 has called for improved talents (Shift 2) and innovations ecosystems (Shift 7) that can develop holistic, balanced graduates (Shift 1). As such, digital innovations and incorporating ICT into teaching and learning are becoming a dominant but challenging issue in the workplace where teachers are being tasked to reengineer their teaching skills to be more technologically-savvy to keep up with today’s student needs. This has led to workplace stress that can impede an employee’s work-life balance and mental health, especially for those struggling with this change. Project ADEPT was developed by the Office of Academic Development for Excellence in Programs and Teaching to address some of these issues of workplace stress of the staff. This has resulted in the development of two online platforms, ELITEOnline and ACCOnline, specifically designed to alleviate the stress and challenges in professional development for staff.

Project ADEPT: Rationale
Recent changes such as the increasing use of information technology and diversity of teacher’s role potentially increase the stress even further (Zahiruddin Othman & Veevkanandar Sivasubramaniam, 2019). Furthermore, expectation to deliver quality teaching has become an issue among teachers and they are exposed to the risk of experiencing job stress (Abdullah & Ismail, 2018). Anastasiou & Papakonstantinou (2014) show that effective and systematic career training and development opportunities enhance teachers’ job satisfaction and reduce emotional stress.

A recent study by Foo (2018) showed that professional development and stress levels were related, and that professional development helped reduce work stress. However, simply going into workshops and trainings does not guarantee effective adoption, and can lead to increased stress, as staff may feel pressure to look savvy among other attendees, and have to remember the steps of the technology after the workshop ends. Learning and adapting to the new technology may require more time which one class cannot fulfill. With an online platform that is user-friendly and collaborative, these stressful issues can be reduced as staff can access these modules at their own time and pace, and revisit them as many times as needed to refresh their memory and skills. Similarly, with curriculum design and reviews, changes that are done manually and via emails, which can also causes work-place stress as staff feel overwhelmed to do these changes individually. With an online platform, redundant work can be eliminated and historical data on these reviews can be easily retrieved to make the next review process easier.

Therefore, because workplace skills development of today requires a more user-friendly approach, ADEPT sought to address this through two innovative online platforms for professional development that are 1) user-friendly, 2) scaffolding and collaborative, and 3) learner-centred.

Project ADEPT: ELITEOnline and ACCOnline
The MMU Teaching & Learning Framework encourages lecturers to improve their competencies in 3 areas: Teaching Instruction, Knowledge and Pedagogy, and Curriculum Design. In doing so, trainings and workshops have been designed on two-fold educational philosophy: 1) Inculcate technology and blended learning skillsets to staff to improve their teaching methods, and 2) Create a process that would enable curriculum reviews to be OBE-centric (Outcome-Based Education) and student-centred. These platforms were underpinned by Kolb’s Experiential Learning theory which enables reflective and heuristic thinking to be attained by the staff.

The ELITEOnline (Engaging Learners, Innovating Teaching Environment) is an online learning portal that serves as a resource for all of ADEPT’s digital teaching and learning content, in line with our T&L Framework. It provides supplementary support to the workshops that ADEPT conducts, whereby participants are able to gain fundamental
technical and theoretical knowledge online at their own learning pace and then be coached on how to apply the knowledge towards relevant real-life scenarios during the face-to-face workshop sessions. ELITEOnline serves as a repository where academics can access videos from past workshops, tutorial videos, learning manuals, ebooks and other digital learning materials. Within the system, administrators are also able to track each participant's progress and generate reports that provide detailed insight into the usage of the learning portal.

The online learning portal was designed and developed similarly to platforms that hosts MOOCs (Massive Open Online Courses) but is used primarily as Small Private Online Courses (SPOCs). Each training is a short “course” with multiple modules that participants can access and complete in their own time. Courses were developed by trainers and subject matter experts with the guidance of an instructional design expert. Each module within the course would contain articles, videos, activities, and quizzes that are designed to engage participants. A comment section is available after each module that participants can use to leave comments, feedback, or questions. Badges are also awarded to participants at certain milestones and custom badges can be awarded by trainers to selected participants. Completion of certain online courses will provide participants with teaching and learning training hours and a certificate of completion.

The ACCOnline (Academic Cluster Committee) is responsible for the review of curriculum design. The ACC review cycle involves several levels, namely Faculty Manager, Secretariat of ACC, ACC member, OBE Champion and Deputy / Deputy Director of ADEPT. In the previous practice, all processes were done via emails and normally took a few weeks to months to complete a review cycle. In order to efficiently manage the ACC review process, the ACCOnline system was developed to automate these processes. ACCOnline manages not only the review process, but also serves as a discussion platform for the reviewers, creating a more collaborative approach to curriculum design and review. In addition, ACCOnline also features a comprehensive reporting tool for all users. This enables all relevant parties to be actively involved in the process, thus enabling a more efficient constructive alignment of OBE into the syllabus, resulting in better learning outcomes for students. With ACCOnline, the review cycle is shortened to days and the consolidated reports are just one click away.

Figure 1 presents the two platforms under Project ADEPT (ELITEOnline and ACCOnline)

Impact:
The advantages of both systems are that 1) They are in line with the Malaysian Education Blueprint’s (Higher Education) Shifts 2 and 7; 2) The have increased the productivity levels of curriculum design and teaching methods by allowing 24/7 access and collaboration; 3) They were designed to be user-friendly with the pedagogically sound underpinnings for effective learning that reduced workplace stress among staff; 4) They are scalable and sustainable for continuous quality improvement, and 5) They were successful in creating a community of learners within the online platforms.

The ACCOnline system has been very successful in reducing the stress of curriculum design and reviews. The system has reduced the turnaround process of 3 months to 11 days, with the collaborative input from domain-specific ACC evaluators and OBE Champions, allowing over 800 syllabus reviews to be conducted in a year. Feedback from users were positive and encouraging. Feedback on ELITEOnline has also been very positive as users were able to undergo their training online at their own pace with the facilitation from instructors and peers. Project ADEPT has acquired 2 copyrights for both systems, and will continue to be improved upon. Both systems have high potential marketability and can be scaled to other content domains, making them sustainable online platforms.

Acknowledgement
We would like to thank the Vice President of Academic & Internationalisation Office (VPAIO), IT Services Department (ITSD), MMU Teaching & Learning Agents (TALENTs), ACC members and OBE Champions, and MMU staff, for their feedback and support for this project.

References
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A 3D-PRINTED TISSUE MIMICKING PHANTOMS FABRICATION FOR ORGAN DOSIMETRY IN MEDICAL IMAGING

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Highlights: 3D-Printed Phantom Made Easy is an easy and interactive module designed for students to serve as a one-stop knowledge and information hub for fabrication of 3D-printed phantoms to surrogate human anatomy and organ dosimetry in medical imaging. To date, there is no structured and comprehensive module that provides interactive information related to radiation attenuation, selection of phantom materials to mimic human tissues and validation of 3D-printed phantoms. This module thus simplifies the whole process related to 3D-printed phantom fabrication. It also provides a simulator for validation of attenuation of phantom material and human tissues.

Keywords: 3D-printed, phantom, attenuation, material, human tissues

Introduction
There is a massive information related to 3D-printed tissue mimicking phantoms fabrication that is available worldwide. Conventional medical imaging phantoms have simple and well-defined geometries that may only be suitable for quality control and characterisation of equipment performance [Dobell et al., 2013]. Thus, a realistic human organ shapes are required for verification of radiation dose in medical imaging [Filippou et al., 2018, Hazelaar et al., 2011, Kamomae et al., 2017, Tran-Gia et al., 2016]. The challenge in fabricating 3D-printed phantoms are limited strong references to guide the students on how to select and validate the materials for simulating tissues with mass densities [Alssabbagh et al., 2017]. We designed an interactive online module entitled as “A 3D-Printed Phantom Made Easy” together with interactive prototype to present a step-by-step guide to fabricate a 3D-printed phantom for organ dosimetry in medical imaging.

Description of the innovation
The interactive module comprises of 6 main sections. The sections are listed as follows:

Phantom materials
A look-up table of 3D materials and conventional phantom materials are provided in this section. The details of the material composition are also presented.

Simulator
The human tissue attenuation properties are provided in this section. The experimental results of selected phantom materials can be simulated for a comparative analysis with tissue reference. If the results obtained does not exceed certain threshold, the chosen phantom material is recommended to undergo the next evaluation test. If the chosen phantom material does not mimic the reference tissue properties, students are advised to choose another material to move to the next stage.

Selection of phantom material
The mass densities of the chosen material will be compared with the reference tissue. A look-up table will be provided as a quick reference for the students in selecting the best material for phantom fabrication.

3D printing process
This section provides a step-by-step technique on 3D printing process. It includes technique to create a computed-aid design (CAD) model of part, convert model to triangulated surface mesh (STL), slice the STL file into thin cross-sectional layers, construct part by part layer and, clean and finish the part.

Conventional phantom fabrication approach
A technique to fabricate a phantom based on conventional approach (moulding technique) is presented in this section. Variety of moulding material can be used to mould the phantom materials. Validation of fabricated phantom This section provides the tests that need to be done to validate the fabricated phantom. This will be a quick guideline for the students to validate the fabricated phantom for medical imaging.

Background of the innovation
The objective of product development is to cultivate and increase students’ knowledge and enhance their experience in fabricating 3D-printed phantom for organ dosimetry in medical imaging. The module provides a step-by-step guide on the easiest practical technique with an interactive approach.

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Importance to education
This module is important to education because it is an aid in teaching that brings a breath of fresh air to the student’s knowledge and improves students’ learning experience. It also assists formal education and distance learning, especially in the recent technology using 3D printer for fabrication of 3D-printed phantom for organ dosimetry in medical imaging.

Advantages of the innovation
3D-Printed Phantom Made Easy offers fun, engaging and enjoyable interactive module for students to choose a suitable phantom material for 3D-printed tissue mimicking phantoms in medical imaging. It can be assessed at any time and at any place. It improves students’ knowledge and enhance their hands-on skill on the fabrication of 3D-printed phantom. It is a one-stop knowledge related to 3D-printed phantom fabrication that simplify the whole process related to 3D printed phantom fabrication. It also provides a simulator for validation of phantom material properties with human tissues.

Commercial value
The module of development of 3D-printed phantom for organ dosimetry in medical imaging is available on MOOCs platform to a vast and diverse audience across the globe where it improves pedagogical techniques and knowledge sharing. This module fulfills the need of students and researchers who are involved directly in this field to have a quick guide on how to design and fabricate the 3D-printed phantom for medical imaging verification. In term of its functionality and performance, the designed module provides a comprehensive module that provides an interactive information related to radiation attenuation, selection of phantom materials to mimic human tissues and validation of 3D-printed phantoms.

Acknowledgement
The authors would like to thank Centre for Development of Academic Excellence (CDAE), Universiti Sains Malaysia for the financial assistance in participating in this conference.

References
PREDICTIVE LEARNING ANALYTICS ON E-LEARNING PLATFORM:
LEVERAGING LEARNING DATA FOR STUDENT SUCCESS

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Highlights
Learning analytics holds the potential to transform the way we learn, work, teach and live our lives. To achieve its full potential, learning analytics must be clearly defined, embedded in the learning and teaching activities, institutional processes and practices, and incorporated into institutional student success strategies. This paper explains both the interconnected concepts of learning analytics and the organizational practices that it supports. We describe how learning analytics practices are currently embedded in institutional systems and practices via UniMAP e-learning platform using OS Moodle. The embedding processes include changing the dimensions of organizational culture, changing the organizational capacity and context, crafting strategies for student success, changing the dimensions of assessment, making meaning of students learning data and executing change management plans for student success. These embedding processes can dramatically accelerate the improvement of student success at institutions via formal formative and summative assessment. For institutions seeking to unleash the power of learning analytics, the key is an aggressive combination of leadership, active strategy, and change management.

Keywords: Learning Analytics, e-Learning, Data Analytics
MOBILE PARENTING SOCIO-LITERACY LEARNING APPS (M-PASL)

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Highlights
In 2017, the Malaysian National Family Planning and Population Board, celebrated the theme “Families, Education and Wellbeing” as a reminder of the role of education to unlock the full potential of children and their wellbeing. Therefore, the aim of this research is to develop a mobile parenting socio-literacy for the family organization which is based on the premise that if experiences from the user personality can be captured in some useful form, the tool will be able to propose the solution in having good interaction between parents and their children. Thus, the parenting guide is proposed to help parents to educate their children by knowing their personality types for both parties which are parent and child. The research is beneficial to society in promoting parenting skills that can enhance parenting literacies. Furthermore, this research is related to interactive learning and decision support system for establishing the relationship between parents and children. Hence, this research will implement the Case Based Reasoning (CBR) technique which is able to give a solution to improve the relationship between parents and child to polish, monitor and improve the strength of each individual specifically and for a family organization holistically.

Keywords: mobile apps, society 5.0, parenting, literacy, personality

Research Design
Research design explicitly explains some phases to be determined in order to conduct the research. Figure 1 shows that the research design consists of five different phases which are preliminary phase, review phase, data collection phase, development phase and validation phase. Every subtopic in this section justifies how the phases are implemented.

Preliminary Phase
In the preliminary phase, the preliminary studies were conducted in order to identify the research problem, objective and the scope of the research which are explicitly discussed in Chapter 1. This phase is the literature review from reports, published papers and journals based on the previous research and related studies.

Review Phase
Review phase is the level which undergoes the literature review for this research. This literature review was conducted to identify the main research concept, techniques, methods, and the variables for this research. This phase was conducted in order to pursue some comparisons between each of these previous papers.

Data Collection Phase (Requirement Analysis and Design Process)
In pursuing and accomplishing the objective of the research, the technique, the essential component (hardware and software) details used, process and procedures for the system were included in order to define how the application is written.
Development Phase

In the development process, a flow chart is constructed to ensure that the process of the system is properly structured. The development phase marks the end of the initial section of the process. Moreover, this phase signifies the start of production. The development phase is also characterised by installation phase. Focusing on practicing can benefit more in this level.

In this study, the development phase focuses on the on the modules used in personal literacy, the technique applied in mobile website which is case-based reasoning (CBR), hardware and the software used for the website development. The progress of the phase is conducted according to the collective data from the literature review. For socio-literacy e-Profiling, the combination of the personality type and the personal literacy are concerned. As in the CBR technique, it shows the processes and methods to analyse the collected data using CBR approach. Figure 2 shows the flowchart for the process of CBR.

The processes to produce mobile application of parenting guide can be seen as a reflection of a particular type of human reasoning. In many situations, the problems that humans encounter are solved with a human equivalent of case-based reasoning. When a person encounters a new situation or problem, he or she will often refer to the past experiences of a similar problem to find a solution. In a similar process, this mobile application involves basic reasoning from previous experiences by retaining solutions of new problems (Romli, et al, 2015).

The process shown in Figure 2 starts with an input features of a problem, which defines a new case without solutions. This particular new case is based on the answers from questionnaires that had been calculating the similarities for the features of input. These features are also used to retrieve cases from the case based library by searching the similar cases. In term of parenting guide as part of the solution, the information will be assessed by using the most similar case. At this stage, the users have two options. If they are not satisfied with the solutions, they can modify the feature values and run the process again in order to improve the solutions. Otherwise, if they are satisfied with the solutions, the case will be retained, and the library to be updated by storing a new learned case. Consequently, this process will increase the cases in the library that can be accessed in future, subsequently re-using solutions for the next new case.
The Importance of M-PaSL

M-PaSL focuses on parent and child. Child is the person who needs to be educated with the correct way. A child wants to have a warm and loving connection with each of their parents and being able to communicate well with each other also can help make that happen. Sometimes, it is hard for a child to open up to their parent. By knowing their child’s type, parent can build the strong relationship with their child. Parenting can be more enjoyable when positive parent – child relationship is established. Children thrive on positive attention. Children need to feel loved and appreciated. Most parents find that it is easier to provide negative feedback rather than positive feedback. By selecting and using some of the solution on a daily basis with child, parent will find that their child will start paying more attention and will try harder to please.

The importance of M-PaSL can be summarized to the following:

- Enhance parenting competencies
- Effective interactive learning system
- Improve parent-child relationship
- Promote parenting skills in a smart society 5.0

Commercial Value

Commercial value can be benefited to other sectors as follows:

- Education: School, University, (Educators and Students)
- Workplace (Employers and Employees)
- Psychologists, career counselors, and other professionals that conduct personality assessment

Acknowledgements

We are grateful to the Department of Academic & International Affairs and Centre of Instructional Resources & e-Learning (CIRel), University Malaysia Pahang for supporting our research works in this project.

References


E-COUNSELING PRACTICUM SYSTEM – COUNSELATOR

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Keywords: Counseling, Documentation System, Counselator

Introduction
When it comes to counselling practices in Malaysia, out of 9 elements of practical, 6 of them are related to documentations. In the mean times, in the study of Rahimi Che Aman and Shafrin Ahmad (2010), they found that 9 out of 10 respondents recorded more hours spent on administration [outreach information, write record and case note] compared to contact hours (met clients face to face). In a nutshell, trainee counsellor accounted more times on documentation when coming to counselling. However, when it comes to current documentation system in Malaysia, we are still depending on traditional methods whereby we are using hardcopy documentation system. Therefore, researchers see that the significance of systematic online documentation system in helping counsellor better organise their documentation.

On the other hand, online supervision has been found to affect counsellor attitude, self- efficacy and counselling competence. Synchronous or on-the-spot supervision enables supervisees to receive faster response. Thus increase supervisee’s self-confidence and competence (Russel et al., 2011). To conclude, online supervision allows on the spot supervision and enabling immediate response from supervisor on their growth.

Looking back at the issue in Malaysia, our current documentation system still needs a lot of improvement in terms of written documentation as well as supervision. Therefore, to further prove the needs of new systematic online documentation system, researchers conducted a survey among counselling students and found that currently 71.4% of counselling students met with the supervisor less than one or none in a month, in other words, in 10 counselling students, 7 of them did not meet with their supervisor at all or only met once in a month. This is a red light indicator, as counselling process requires a constant and on-going supervision to ensure student’s growth. Besides that, researchers also found that how aware are counselling students on their own practicum hours, from the results, there are a total of 17.9% of students are totally not aware of their individual and group practicum hours and a total of 35.7 % of students are not aware on their guidance hours. From here, it shows that there are that chances counselling students unable to finish their program on time as in collecting practicum hours, it requires a total of 252 hours. Being unaware of their own hours progress will cause a delay in collecting process. Therefore, by using these as the guide, researchers come up with an idea on developing a new online systematic documentation system to help counselling students.

Description of innovation
In the development of product, there are 4 stages involved, referred to as to Gate Process. For the first stage, Idea Generation, where researchers targeted the product users as counselling students and highlighted the basic main concept which are practicum system. In generation of ideas, researchers browse through all the information collected on current practicum system. From all the information collected such as Thera nest, note counsellor web, counsellor app and many more, researchers get a closer look into ideas products.

In the next stage, idea screening, researchers main tasks was to remove ideas that do not fit to our concept through discussion. A set of criteria was also discussed in order to measure our products. For example, How target audience benefit from our product? How our product resolves current practicum issues?

Moving into next stage, concept development, researchers focused on discussing which features to be added into concept. In this stage, a survey was conducted via Google Forms and semi-structured interview sessions with counselling students, counselling lecturers and practicum coordinator. The main purpose was to determine the needs from potential customers and their expectations.

From the information and discussion gathered, the researchers finally came out with a list of criteria and functions that need to be in the new product. After that, researchers started working on producing a prototype layout of the new design of online documentation system through Balsamiq Mockup. With the prototype layout, researchers hired a programmer on coding and setting up the prototype into a usable online system, Counselator.

Lastly, to prove the usability of the new online documentation system, Counselor, researchers conducted a quick usability testing with counselling students. A summary of results are shown in Table 1.
Table 1
Summary of Mean Time on Tasks, Errors, Task Completion Rate and Mean Satisfaction

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Mean Time On Task(s)</th>
<th>Errors</th>
<th>Task Completion Rate (%)</th>
<th>Mean Satisfaction*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Login as student into home page</td>
<td>25</td>
<td>0</td>
<td>100</td>
<td>4.20</td>
</tr>
<tr>
<td>Edit and change profile picture</td>
<td>48</td>
<td>0</td>
<td>100</td>
<td>4.30</td>
</tr>
<tr>
<td>Edit personnel profile information</td>
<td>63.5</td>
<td>2</td>
<td>100</td>
<td>4.30</td>
</tr>
<tr>
<td>Find out when is the due date for</td>
<td>24</td>
<td>1</td>
<td>100</td>
<td>3.75</td>
</tr>
<tr>
<td>submission of reports and borang 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State what is the overall hours</td>
<td>11.3</td>
<td>0</td>
<td>100</td>
<td>4.37</td>
</tr>
<tr>
<td>collected in semester 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Download “panduan &amp; laporan sesi</td>
<td>35.5</td>
<td>0</td>
<td>100</td>
<td>4.03</td>
</tr>
<tr>
<td>kaunseling” file</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Download individual session case note of</td>
<td>25.8</td>
<td>0</td>
<td>100</td>
<td>4.03</td>
</tr>
<tr>
<td>A2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upload individual report for semester 4</td>
<td>90.8</td>
<td>2</td>
<td>100</td>
<td>3.70</td>
</tr>
<tr>
<td>and claim 10 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the usability testing results and overall rating results, researchers came to a conclusion that the website is good with functions that are helpful to the users, and it also showed from the results of overall rating that all participants agreed the site content will get them to come back to the site and they will use the website frequently. Although it is not really user-friendly at first attempt, all participants agreed that it could be learnt quickly after few attempt. However, there is a need for improvement from the website design and layout based on the results.

In summary, Counselator possess multiple features as below in the current phase:

- Documentation (upload, download & review)
- My Hours (calculation of total collected and remaining hours)
- Information Corner (Supervisors give standardized information and document)
- Coordinator Monitoring
- Features to be in the next phase:
  - Calendar (set up the session and guidance program schedule online and this will be synchronized with their supervisor calendar so that the supervisor can go for supervision)
  - Reminder (constantly remind to do report)
  - Ranking (based on the total number of collected hours)
Advantages
Counselator benefits three major target users. The advantages benefit trainee counsellors, supervisors and coordinator in three major task consists of documentation, supervision and calculation of counselling practicum hours.

Counselator benefits the trainee counsellors by offering a virtual platform for systematic organization of counselling practicum documents such as counselling session reports and memorandum according to semesters. This reduce the tendency of misplaced and missing documents. Counselator also functions as a medium for cyber-supervision. The consultation with supervisor is done virtually despite the time and place. This allow supervisee to get instant feedback and response without having to wait for face-to-face appointment which acquire mutual availability from both supervisor and supervisee. Hence, supervisee will be more aware of self-progress as counselor allow continuous monitoring from supervisor and documentations are more organized.

Counselator benefits supervisors as it is enables supervisor to keep track on supervisees’ progress, making supervisor more aware of necessary action to be taken. Report checking and endorsement will also be more convenient as supervisor can view the documents anywhere and anytime. The calculation of practicum hours is more accurate as it allows instant update of practicum hours tally with the hours proposed in reports.

Counselator benefits coordinator as it offers a virtual and holistic monitoring platform through the database available online, without having to flip through hardcopy pages as in current method. The management also will be more standardized as Counselator offers the announcement and knowledge centre enabling coordinator to deliver information first-hand, thus avoid miscommunication.

Commercial Value
Counselator has the potential to go nationwide based on its benefits and the features it offers. The suggestion of plan for product commercialization will go through few phases hierarchically by considering initial features and future stakeholders.

The beginning of commercialization of Counselator will be implemented at the faculty level. Faculty of Cognitive Science and Human Development (FCSHD) have several major courses such as Counselling, Human Resources and Development, Cognitive Science and Psychology. During InCoun 2018, Mr Sophian, an evaluator from Cognitive Science programme suggested the developer to collaborate with Cognitive Science students and lecturers in term of programming and information technology (IT) management of Counselator. Counselator will require continuous monitoring and maintenance in system especially for its security to protect and adhere with confidentiality.

Counselator will be implemented in UNIMAS for pilot test to identify any necessary improvement for the final product. The calculation of 252 counselling practicum hours had been standardized by the Lembaga Kaunselor Malaysia as a compulsory requirement for future counsellors. The total of 252 counselling practicum hours are divided into individual counselling session, group counselling session and guidance counselling, each has its specific minimal counts of hours. Counselator will be proposed to Lembaga Kaunselor Malaysia to ensure its features abide the requirements.

As Counselator passes through Lembaga Kaunselor Malaysia, Counselator will be proposed to Ministry of Higher Education (MoHE) to propose the implementation of Counselator to all tertiary educational institution that offers counselling program either for undergraduate or postgraduate.

Considering the potential and features of Counselator, it is undeniable that Counselator has huge potential, chances and opportunities to go nationwide, fulfilling the needs of counselling education in Malaysia in this technology era.

References

E-LEARNING PROGRAM FOR CHILDREN SELF-PROTECTION AND AWARENESS

Kydon Learning Systems Sdn Bhd

Highlights: It is an e-learning program to raise awareness among the school children of child abuse topic in Malaysia. The idea is to connect the classroom to the real world. This program comes with a series of courses that will provide a full-pathway for the school children to learn the knowledge of self-protection and practice/application of the knowledge they have learnt. The e-learning package could be exported to SCORM/xAPI and uploaded to any of the learning management system.

Keywords: e-learning, scenario-based learning, school children, child safety and protection

Introduction
Of late, we have seen school bullies and child abuse cases reported in the news. According to the report, nearly seven out of 10 Malaysian children are worried about being bullied (NST, 2018). Based on the Welfare Department’s statistics, there are approximately 14 child abuse cases that occur in a day and many more are assumed unreported (NST, 2018). School children often do not have the necessary awareness and knowledge that is required to deal with these types of assaults, especially regarding peer bullying (Holt, Kantor, & Finkelhor, 2008). Despite being vital, the knowledge of this field is yet to be included as part of the school syllables. This is mainly due to the cost and time incurred for the implementation being hefty. However, what if this general knowledge could be promoted and taught through a simple video animation and interactive activities for the school children through e-learning? The advantage of e-learning is the ease of accessibility and could be implemented widely in schools as a group or as well as individually at home.

Description of the product
The learning package consists of 3-minute animation videos and a hyperlink to access the practice activities.

Animation video
At this stage, the concept and awareness are created through an explanatory video. The video contains three parts, namely introduction, content and summary. The animation video is designed based on Mayer's 12 Principles of Multimedia Learning and the awareness is explained through a scenario. The scenario given is based on the Malaysian context and daily life of a student. This is to create connection between the learners and their daily situation. The animation will be kept within three minutes in order to maintain the attention span of the children.

Practice activities
The practice activities will come after the animation video. It is designed based on branched scenarios in order to bring course content to life by having the learners to make decisions and then give the learner in-context and realistic feedback. The activities would be created using Articulate Rise, a responsive authoring tool. The scenario is described using branching method and the simulation would have audio, video or texts for the learner to understand the scenario and take further action. Every action taken will lead to different results that applies learner-centric approach as foundational underpinning.

Background of the design
The scenario-based learning is implied in the designing concept. According to Core, Georgila, Auerbach, DiNinni and Playa (2016), scenario-based learning works effectively when it is used to stimulate real-world practice and provide opportunities to the learner to experience the real-world situation. Furthermore, it also promotes active learning and engagement in the learning.

The importance of the product to education
Bullying and violence should be monitored and receive more awareness from the society (NST, 2018). The need to address the issue is significant and the self-protection awareness ought to be raised to the school children by using an educational approach (Saracho, 2017). The knowledge of self-awareness on one’s safety is considered as a holistic education but yet to be implemented in the schools in Malaysia. This program helps to increase children’s personal safety and enables them to protect themselves. It improves the knowledge of self-protection skills in children and cultivates a sense of safety awareness for themselves and prevents any unfortunate incidents from happening.

Advantages
The design concept of the product is “one and for all”, in other words, this product can be used by anyone. The school can make use of the designed e-learning package and use widely by teachers, parents and individual. It can be part of the teaching materials to be used in schools, learning aids of the parents at home or the children to perform their own self-paced learning.

**Commercial Value**

We would like to develop and publish a “child protection and a child safety” series/course and commercialise it upon the demand.

**References**


THE EFFECTIVENESS OF E-ALMUNAWWAR AS AN INTERACTIVE TOOL FOR LEARNING ARABIC LANGUAGE IN UNIVERSITI MALAYSIA KELANTAN

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Highlights: The advancement of technology has undoubtedly brought rapid changes and contributed to the rise to developments in many aspects of life, including in education. Consequently, the roles of educators and practitioners have undergone significant changes as teaching and learning tools, as well as educational materials become more diversified and learning takes place in a borderless world of shared resources. Exciting transformations in education that should be embraced and further explored, especially in language teaching and learning because language is an essential part of communication. Language has also become an important requirement for employment and a key success factor in life. This paper aims to explore the effectiveness of e-Al-Munawwar in the process of teaching and learning Arabic language proficiency by emphasising the use of cybergogical tools in learning process. To ensure the effective use of these tools, we have employed an appropriate instructional design. Sets of questionnaires on students’ needs and perceptions were administrated to 196 students taking the elementary Arabic language course at Universiti Malaysia Kelantan (UMK). Descriptive quantitative analysis, through the use of IBM SPSS statistical software, was employed to analyse the data collected. The results show that there are positive responses over the adoption of technological tools for language learning as it increases students’ motivation to learn Arabic. Pre-test and post-test are implemented in order to measure the effectiveness of e-Almunawwar in terms of student achievement in language learning.

Keywords: Cybergogy, language learning, instructional design, Arabic, Effectiveness

Introduction

Virtual learning or e-learning now has become an optional learning style. Through an internet medium as an intermediary, self-directed learning concepts, characterized by multimedia and user-friendly make them more popular and popular. E-learning has now been recognized by educational institutions and the corporate sector as a power capable of transforming achievements, performance and skills (Alwi, 2004). Virtual learning has been embodied in the National IT Agenda launched since 1996. Some of which have been outlined are some guidelines on how Malaysia can emerge as a developed nation by creating virtual learning.

This idea was later expanded with the introduction of the Smart School learning concept, e-learning and open university. In 2007, the IPTA Malaysia Co-ordinating Head of Council (MEIPTA) was established to fulfil the objective of the Ministry of Higher Education (MoHE) to strengthen the quality of teaching and learning in public institutions of higher learning (IPTA). This is due to the rapid explosion of information and communications technology. E-learning is now identified as having many interests in the world today and in the future.

Various studies have been conducted on e-learning found that classes conducted using computers as teaching mediums were highly sought after by students (Fazzlijaan Mohd Adnan Khan & Mona Masood, 2014). This is because the content of the text or its teaching materials can be integrated with the use of graphics, audio visual and multimedia as well as interactive makes it very interesting. This method is more effective than traditional methods which are increasingly considered to be boring (Nurazamuddin Umar, 2005). This method is best suited to encourage students to learn beyond formal teaching classes. They can access information regardless of time and place.

Therefore, this project aims to explore the effectiveness of e-learning in learning Arabic language at Universiti Malaysia Kelantan. The researcher adopts e-almunawwar as online interactive tool to facilitate the students in Arabic language learning.

Results

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-Test</th>
<th>Treatment</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>Q1</td>
<td></td>
<td>Q2</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>Q1</td>
<td>X</td>
<td>Q2</td>
</tr>
</tbody>
</table>
Table 1: Significant Difference of Pre-Test Score Between Experiment Group and Control group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>df (N - 2)</th>
<th>t Value</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>Experiment</td>
<td>55.28</td>
<td>3.18</td>
<td>58</td>
<td>-0.77</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>55.95</td>
<td>3.13</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Significant Difference of Pre-Test Score Between Experiment Group and Control group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>df (N - 2)</th>
<th>t Value</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-test</td>
<td>Experiment</td>
<td>83.53</td>
<td>5.57</td>
<td>58</td>
<td>21.799</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>53.65</td>
<td>3.55</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant level of alpha (α) = 0.05

References
EVIDENCE-BASED TEACHING AND SUPERVISION USING MOOC

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Highlights: Emerging methodologies within entrepreneurship education research field is immersed into the importance of the theory and the application of theory into practices. The course presents an immersive and blended focus: engaging teaching of entrepreneurship process orientation and research issues associated to it. Some 1,700 students locally and abroad with 9,323 comments participated in MOOC OpenLearning.com platform from 2016-2017. While another 232 students using e-Campus online learning platform at Universiti Malaysia Kelantan in 2018-2019. With the high levels of uncertainty permeating the entrepreneurship field, the research focus is not just about new company, capital and job creation; nor innovation, nor creativity, nor breakthroughs. The entrepreneurship research should foster an ingenious human spirit and improving humankind. The immersive and blended focus of introducing the methodology is to unleash research setting in the entrepreneurial spirit among students, cultivate a mind-set of practice and build environment in which entrepreneurship research could be made robust, rigorous and the implication of its practical and theoretical can occur. Like any other discipline, entrepreneurship is a discipline and it can be learned and ultimately, research methodology in entrepreneurship can also be learned, offers systematic approach, transferable and scalable. By introducing entrepreneurship research methods; this course aims to pave the way for increased application of innovative research methodologies and techniques, allowing teaching and supervision quality. This paper is one of the evidence to indicate that innovative entrepreneurship research ideas can be developed once the students know and understand on how to connect with theory development, information literacy skills through online, secondary and primary sources. The paper is also offering e-assessment on the quality of the research methodology and writing up the proposal.

Keywords: research methodology, entrepreneurship, immersive, blended learning

Introduction
Many students are struggling in writing research proposal and weak in understanding the research methodology. Entrepreneurship research in this era of 4th Industrial Revolution has the answer to connect interdisciplinary nature of entrepreneurship study in an effort to exploit opportunities within diverse networking and collaborative economy; green and climate changes; waste-to-wealth; big data analytic and entrepreneurial digital marketing; social products, and sustainability issues; to name a few. Thus, demand for research in entrepreneurship issues has grown exponentially. The research methodology is thus needed to be advanced for all type of students using specific entrepreneurship research tool of practices. The methodology is to make the research process of learning interesting. By understanding on how to summarize all of the concepts in research methodology that is required to write research proposal - students will find their journey of writing less painful and an exciting one.

To provide students with the tool to develop an understanding of the research methodology in the entrepreneurship issues and its processes using appropriate pedagogical practices
To innovate entrepreneurship research ideas after learning on how to connect with theory development, information literacy skills through online, secondary and primary sources;
To assess on the quality of the research methodology and writing up the proposal.

Approach
The theoretical foundations of experimentation in guiding the new context of innovation in research methodology course was integrated from the pedagogical practice of the work of Howard et al (2003) and Bisker and Goldner (2004). The evidence-based learning was originally used in the field of health care and medical practices.

In the context of entrepreneurship discipline, this course adds the value of humanistic approach to the practice; where entrepreneurship students examine a situation, consider the evidence (literature/setting/phenomena of issues) from possible effective interventions and apply the intervention using a combination of judgment and evidence. The model works on the evidence-based learning integrating the entrepreneurship as a discipline and it is further illustrated in Figure 1. Skills required in this course demands the ability of the students/researchers: to search for empirical evidence; to critique, interpret and synthesize the findings; and finally to decide how the literature (evidence) supports or not the particular intervention.

DeTAR Putra, Universiti Malaysia Sarawak
The evidence-based learning process is interactive and iterative. Learning on the research methodology aspects in the entrepreneurship education is rooted in student experience and faculty interaction around a problem. Students evaluate evidence, critically assess perspectives and look for patterns that can be understood in order to meet the objectives of the research.

The approach in every research has its own systematic conduct. There are two main approaches used in this course, firstly, the inside and the outside classroom. The inside and outside classroom engagement appears to inculcate the immersive, blended and interactive moments between students and faculty. As illustrated in Figure 2, this course offers new innovative solutions to promote research quality, both in writing skills and presentation skills. In the classroom, for example, the transferable values would be in the format of a shared set of exercises that can be used in the classroom to help the students with their research ideation, conduct primary and secondary data for evidences, identify suitable methodology, proceed with entrepreneurship research proposal and present their result in both oral and research proposal writing.

In the scalable approach, this course uses a research evidence-based learning through experimentation methodology. Outside the classroom, students live entrepreneurship through the engagement and guidance from the Faculty; which is the result of faculty and students working together to define a framework of their research plan. This provides access to resources for students to move on with their research ideas forward.
Benefits of Immersive Learning

This approach assists the learning to be immersive in that it creates a more rounded interaction between students and faculty. The approach used appears to benefit students in developing various skills to produce quality research proposal and use appropriate methodology. This includes benefits as set in Figure 3 below:

1. Students generate and explore research ideas in entrepreneur issues. Please refer to Figure 4: Evidence from MOOC-OpenLearning Platform. The link can be accessed here: https://www.openlearning.com/courses/research-methodology-in-entrepreneurship;
2. Students acquire digital online search skills to explore data search and develop a unique literate matrix to look for the research gap and trend in entrepreneur issues;
3. Students develop critical thinking, creative thinking and leadership skills in delivering judgments, best guesses and interpreting the evidences;
4. Students benefits from the engagement with faculty who serves to mentor and coach students in writing quality proposal; and
5. Students benefits to develop new social skills using Web2.0 tools where they interact, weight, discuss and present their final research proposal. Refer Figure 5: Evidence from E-Campus Platform by Universiti Malaysia Kelantan. The link can be accessed here: http://ecampus.umk.edu.my/sep2018/course/view.php?id=212
Figure 3: The benefits of Immersive Learning

- Use of most appropriate information to make complex decisions
- Acceptance of fallibility & incomplete information
- Interpret, critique, & synthesize evidence (literature)
- Guide
- Cumulative interactive learning

- Research Ideation Canvas
- Literature Matrix
- Research Feasibility Blueprint Guidelines
- Mentor & Coach
- Presentation Checklist

- Students are generating and exploring research ideas
- Starts with existing data search & literature matrix
- It is not possible to fully access all empirical evidence; therefore judgments, best guesses and interpreting the existing evidence would be central to the discussion
- the engagement and guidance from the Faculty; which is the result of faculty and students working together to define a framework of their research plan
- Students would interact, weigh, discuss and present and write final research proposal
Figure 4: Evidence from MOOC-OpenLearning Platform
e-Assessment in Methodology in Entrepreneurship Research

More than 1700 students participated in the design and assessment of the methodology in entrepreneurship research. Results as indicated in Figure 6 demonstrated that students from L1L2 groups (240 students) had achieved better performance than other groups. L1L2 was guided using the learning approach as offered in this course.

The course offers novelty and inventiveness in the aspect of:

- use of E-Campus Platform by Universiti Malaysia Kelantan and MOOC online OpenLearning Platform (3)
- Facebook Close group platform
- interactive tools and animation to construct various teaching materials
- engagement of mentor and coaching of information search, research writing and presentation skills both at physical and online interaction

Figure 5: Evidence from E-Campus Platform by Universiti Malaysia Kelantan.
New Skills Developed
The course had developed several important skills as illustrated below.

Figure 6: e-Assessment Results on Student Performance

New Skills Developed
The course had developed several important skills as illustrated below.

Figure 7: New Skills Developed

The approach is able to increase the understanding on the need for risk taking, creativity and team building in order to effectively plan the activities. The e-assessment of the research-based process and action is able to exploit opportunity recognition in entrepreneurship research methodology. The pitching of long term funding plans as a result of being able to address the entrepreneurial issues and problems for pre-startup activities has helped to develop
students’ presentation skills. Students are able to transfer their knowledge to meet the need of the research objectives and to develop and redevelop business plans for potential future projects. This paper is one of the evidence to indicate that innovative entrepreneurship research ideas can be developed once the students know and understand on how to connect with theory development, information literacy skills through online, secondary and primary sources. The paper is also offering e-assessment on the quality of the research methodology and writing up the proposal.

Acknowledgement
The author thanks Universiti Malaysia Kelantan for the support on the MOOC platform and funding assistance to participate in IIDEL, IUCEL 2019.

Recognitions
- MOOC in Teaching And Learning Competition 2019. Evidence-based in teaching and supervision using MOOC At Universiti Malaysia Kelantan – Gold Award
- Innovation and Research Week and STEM CARNIVAL, Universiti Malaysia Kelantan 2017 – Bronze Award
- KNOVASI 2017 – Using The Methodology In Research Interventions That Assist To Develop Meaningful Teaching And Learning Tools - Gold Award
- Innovation and Research, Universiti Malaysia Kelantan 2018 – Using The Methodology In Research Interventions That Assist To Commercialise Two Products – Mobile Apps In TVET2U (Silver Award) And Silver (OKU2U)
- MOOC In Teaching And Learning Competition 2018. Research Methodology In Entrepreneurship Course: A Platform For MOOC At Universiti Malaysia Kelantan – Silver Award
- Teaching Enhancement And Learning Innovation Carnival 2018, UMK Bachok Campus, Kelantan, 16 May, 2018. Gold Award
- ITEK 2018 – Using The Methodology In Research Interventions That Assist To Commercialise Two Products – Mobile Apps In TVET2U (Silver Award) And Gold (OKU2U)
- Two Certificate Of Appreciation On Receiving Awards At International Level For Both Item 4 Above From The Vice Chancellor UMK
- Teaching Enhancement And Learning Innovation Carnival 2018 - Gold Award And Overall Best Award
- Certificate Of Appreciation - Anugerah Khidmat Cemerlang 2017
STARTUP USING QUADRUPLE HELIX MODEL USING E-CAMPUS

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Highlights: The philosophy of the immersive learning with community (rural entrepreneurs, schools’ communities, university, industry) using opportunity-based as set in this course is to deliver a viable change through the creation and sharing of knowledge with community. The extent of competencies acquired by graduates at the Universiti Malaysia Kelantan serving the community was evaluated using new assessment called Quadruple Helix Model. Students’ ideation project was presented and assessed in a one-day event – STEM Mentor-Mentee Day. On the event day, some 83 graduates from the university delivered the programmes to 120 schools students. In order to assess the impact of learning outcomes, 43 schools with upper primary and lower secondary levels were recruited for the programmes. The market validation was done among buddy entrepreneurs, local communities, selected industry partner, and school communities: students and teachers. Finding suggests that the new assessment using Quadruple Helix model is effective in gauging the impact of entrepreneurship education on graduates’ entrepreneurial orientation. An in-depth analysis of the participating stakeholder feedback suggested graduates acquired additional competences knowledge during the process. The intervention was found to positively impact on the participating communities and offer new method of assessment. The immersive use of Quadruple Helix assessment is novel in that, it examines the ‘learning-by-doing approach’ to develop innovative assessment methodologies. This approach enhances the entrepreneurial education to develop a generalised assessment model for the use of wider education community, nationally and internationally.

Keywords: Learning-by-doing, Quadruple Helix Model, assessment tool

Introduction

The primary motivation is on understanding students’ engagement in entrepreneurial learning-by-doing activities which appear to be lacking. A seminar concept here is translated into an activity of an event associated with entrepreneurship values, spirits and mind-sets. As illustrated in Figure 1; there are five stages. The first and second stage is focused on the ideation and developing operational plan. Here, appropriate concept of commerce and entrepreneurship is applied. Next, the pilot testing/prototyping and the creation demonstrates the creativity in entrepreneurship education and delves into the world of creation. The experimentation stage brings the process of learning from the results and trying it again. The new venture creation is then established so as to ignite the entrepreneurial spirit exposes students to life applicable issues. Intervention involves to boost the confidence and capacity to risk into ideation of venture startup; which presently remain low among students. Students are able to understand the process of design thinking. Examples of the creation of ideas and wealth opportunities for others to further arrest the rising rate of unemployment were highly used.

Figure 1: Entrepreneurial Learning-by-Doing: an Integrated Model

The following are the objectives of this paper:

- to determine the competencies in learning-by-doing in entrepreneurial activity amongst students held in a one-day seminar event;
- to examine the robustness of the entrepreneurial theory (Gibb’s model & social innovation models) when use into practice;
- to examine the extent of immersive learning with community using opportunity-based and student’s ability to interact with different stakeholders during the one-day seminar event.
The Approach

The learning approach of Gibb’s (2002) model was modified using the induction; developing valid ideas; developing operational plans and resource identification; negotiation of opportunity; implementation; and survival. Elements of Social Innovation as in Raja Suzana et al (2017) was then integrated into Gibb’s (2002) model to reflect the momentum of learning entrepreneurship by youth in the Malaysian context. Based on the stages of entrepreneurial learning-by-doing, the developmental stages is illustrated in Figure 2. Table 1 summarizes the integrated model.

Table 1: Integrated Model of Entrepreneurial Learning-by-Doing

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Start with raw idea</td>
<td>Ideation based on opportunities</td>
<td>Having assembled a team and obtained the guidelines of the programme; the teams identify suitable stakeholders and begin to develop ideation</td>
</tr>
<tr>
<td>2</td>
<td>Moving from raw idea to valid idea</td>
<td>The team identify barriers, test if the idea will work and understand the operating condition</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Develop operational plans and resource identification</td>
<td>Lean-startup canvas or social business model canvas (whichever appropriate) to plan for appropriate value proposition</td>
<td>The team identify the market, resources, and promote the activities and establish their financial plans</td>
</tr>
<tr>
<td>4</td>
<td>Scale to business plan and negotiation</td>
<td>Prototyping and piloting – ideas that piloted or prototyped is transferable</td>
<td>This includes the following considerations: • Developing appropriate systems to effectively run the activities; • Identifying the appropriate resources; • Negotiating with customers, suppliers, premises managers and all stakeholders to ensure successful project outcomes; • Evaluating the events and making appropriate adjustments for future project developments; • Developing business plans for future development based on learning from the initial project</td>
</tr>
<tr>
<td>5</td>
<td>From negotiation to birth</td>
<td>Creation – establishes a new form of creativity in entrepreneurship education and delves into the world of creation.</td>
<td>This includes demonstrating the viability of the projects. The completed events provide evidence for future larger scale and initiate crowdfunding projects.</td>
</tr>
<tr>
<td>6</td>
<td>From birth to survival</td>
<td>Experimentation; where ideas implemented through learning process offer some results. Students develop new approach and then trying it again and again; and evaluate the impact to the communities and becomes part of the norm.</td>
<td>This is done through pitching long term co-creation of crowdfunding plans to independent judges by experimenting the proposed ideas are workable. The pitching process were done as experimentation to several different stakeholders. This enables the team to verify the effectiveness and viability of their projects</td>
</tr>
</tbody>
</table>
Implementation
The programme involved students working with different stakeholders in an interactive learning environment to generate idea and revenue for communities. As illustrated in Table 2, the transferable value is demonstrated by use of the tools and the explicit documentation of the learning materials; where it can be replicated both by learners/new startups/communities of learning in rural and disadvantaged groups.

The scalable values have two-fold contributions: (1) entrepreneurial teaching and learning process: are some of the reflection derives from the extensive teaching notes that describes the exercises, learning outcomes, classroom plan, summary points reading for theoretical foundations and teaching tips; (2) communities experimentation: the idea will bring the real learning-by-doing approach as a viable pathway to meet and assist communities to enhance or improve their business process, marketing, finance, new product development, design and offering, etc. Figure 2 summarizes the extent to which the courses offer systematic learning and elements of the transferable and scalable. Figure 3 explains the flowchart of how elements of the transferable and scalable are codified and made meaningful to the learning outcomes.

Figure 2: Developmental Stages

This approach assists the learning to be immersive in that it creates a more rounded interaction between students, faculty at university level; between students and communities, industry and government/NGOs. The approach used appears to benefit students in developing transferable and scalable skills.

The e-campus and Facebook Closegroup (see Figure 5) offer a space for all learning engagement and activities Teaching materials was shared in the e-Campus platform by UMK. Assessment, however is done at both; (1) recorded and video online version from YouTube into the platforms and (2) final assessment – during the Seminar event day, students pitch their products or services that had value to the communities of interest. The evaluation was done 360 degree among the schools students, teachers, buddy entrepreneurs and other independent faculty. Evidence from the activities was captured in both Facebook closed group and the e-campus system.

At cognitive level, students are able to portray good sense of knowledge and comprehension. Students are also able to analyse and synthesis knowledge and information based on the opportunities exploitation activities.

At psychomotor level, students are able to respond to different situations and develop entrepreneurial mindsets. In this manner, students react towards the need for risk taking, creativity and team building in order to effectively plan the activities.

At affective level, students are able to portray active participation, and react to a particular phenomenon. For example, to develop potentially viable plans and appropriate timescale, to identify potential resources and facilities and to co-ordinate team roles and responsibilities.

Figure 3: Systematic learning and elements of the transferable and scalable

Benefits of Quadruple Helix Engagement Model
Impact on Students, Teaching and Learning Implementation

Examples of portfolio digital can be retrieved at Section E3 above. Evidences includes learning-by-doing market validation; presentation to stakeholders during the Seminar Day as an event; evidence on module developed for the ideation of business idea; testimonials from customers, and communities (in this project, communities are school children and school teachers). Further innovation tools at work is illustrated below.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
<th>Innovation at Work Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ideation based on opportunities</td>
<td><img src="image-url" alt="Innovation at Work Tool" /></td>
</tr>
</tbody>
</table>
2. Social Business Model- startup canvas to plan for appropriate value proposition

3. Prototyping and piloting – ideas are then piloted or prototyped

4. Ideas implemented and develop new approach and impact to the communities

To test the graduates’ competencies in packaging their enterprise value through learning-by-doing
Using descriptive statistics, the learning outcomes is analysed:
By calculating the average score (total marks/no. of students) divided by weightage of each of the learning outcomes and multiplied by 4.0.
Remarks:
+ 0.00-0.99 (Very Poor)
1.00-1.99 (Poor)
2.00-2.99 (Good)
3.00-3.69 (Very Good)
3.70-4.00 (Excellent)

<table>
<thead>
<tr>
<th>To explore trade and business entrepreneurship’s concept through seminar</th>
<th>To organize seminar handling process and the ways in which they are implemented to build high confidence in doing the activity</th>
<th>To evaluate situations and decisions that give impact on seminar activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marks</td>
<td>1376</td>
<td>1440</td>
</tr>
<tr>
<td>No of students</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>16.6</td>
<td>17.3</td>
<td>48.4</td>
</tr>
<tr>
<td>0.83</td>
<td>0.87</td>
<td>0.81</td>
</tr>
<tr>
<td>3.3</td>
<td>3.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Very Good</td>
<td>Very Good</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Conclusion
The use of digital technologies such as Webtool 2.0 has deepen student engagement with technology in managing new business and promotion of the knowledge of Industry 4.0 as set in Figure 7 below. Social skills in using various technology had changed the way students’ respond to market needs, conduct market validation and support local and rural communities entrepreneurs to improve their enterprise value.
A key feature of the learning-by-doing model was to encourage the students to be creative and develop social skill by way of interaction and soft-skill in communication using a portfolio of ideation, creation, implementation and experimentation, in their approach to overcoming what could be significant challenges, such as the generation of revenue without a budget. The teams had to think proactively in order to obtain the resources required. This includes negotiating skill such as the free use of the facilities of the university for their events, obtaining support for their campaigns from the Students Union, and securing sponsorship from businesses and individuals. Negotiation with sponsors involved students highlighting the positive benefits of participating in the sponsoring projects, such as improving their reputation for corporate social responsibility and values.

Acknowledgement
The author thanks Universiti Malaysia Kelantan for the support on the MOOC platform and funding assistance to participate in IIDEL, IUCEL 2019.
ENGLISH LANGUAGE PROBLEM-BASED LEARNING VIA MINECRAFT:
HACKING THE TRADITIONAL LESSON PLANS

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Highlights: This project proposes a framework comprising of 8 lesson plans which integrate multiple Microsoft tools to promote authentic, interdisciplinary, multiple ways and meaningful English learning. At the end of the project, students would be able to produce a minecraft game guided by a story board provided in this framework. Basically, the project reflects the combination of students’ creativity, self-determined learning and team work in solving the issues and real-world problem highlighted in this framework.

Keywords: Minecraft, class technology, student learning, SLA, e-learning

Background of Kitty Go Happy Minecraft
This project comprises of 8 suggested lesson plans which help the students to produce and design their own Minecraft and make it possible for English teachers to embed as much as language input in all the stages proposed. 8 stages are proposed to enable the learners’ experience in English language problem-based learning via Minecraft.

STAGE 1: SEARCHING FOR INFORMATION

LESSON 1
Tools to be used: ONE NOTE & MICROSOFT EDGE are suggested to be used in this stage.
(To replace One Note, another option is you can use Google Doc where anyone can edit it collaboratively)
(To replace Microsoft Edge, you may use any other search engines such as Google Chrome/Mozilla Firefox/ Yahoo Search)

Description: This is a pair share technique
Teacher encourages exploration first, and it must be done by students individually, not in group because we don’t want some of the students to be the sleeping partner
With partner, they combine the information that they gained and choose the best information which they decide together. In this phase, everyone shares responsibility and makes substantive decision together. In our pilot project, the teacher said that she could see that the students feel they are important since all the decisions come from them.
In this stage students discuss the issues of animal welfare, the problem that happens around the world regarding the issues and find the possible solution to the problem.

STAGE 2: FINDING SOLUTION & DOING PRESENTATION

LESSON 2 & 3
Tools to be used: IMMERSIVE READER
(To replace Immersive Reader, you can use Google Translate, or any other apps that aid in translation/pronunciation/ meaning in context)

Description: Students need to identify verb, first they need to look again at the articles that contain solutions of the issues discussed earlier in the previous stage, and they need to find at least five verbs that are used describe the way to solve the animal welfare problems.
Teacher needs to use immersive reader because it is easier for the students to identify part of speech. This means, when they read the article, this technology will help them to detect verb, noun etc just like a dictionary.
In the activity of using Flip Grid, everyone is presenter. They need to record a 2minute video of themselves talking about the best solution to solve the issue. This is to develop the self-confidence. At first, they might feel shy but after they see the other students’ video, they are motivated to improve themselves.

STAGE 3: CREATING PRODUCT FOR AWARENESS PURPOSE

LESSON 4
Tools to be used: MICROSOFT PHOTO

Description: It is a collaborative activity, everyone will have their own responsibility
The first member of the group must look for the suitable photo to be included in the video, the second member need to design the text to promote the message, the third one will look for music to be used in the video, and the fourth member needs to produce the video using the material that his friends have provided.

The teacher needs to use the Microsoft photo, because it is time saving. The students will only complete all the tasks estimated for only half an hour. All members finally need to discuss together on how to improve the video.

At this stage, students learn to work interdependently and everyone contributes equally to produce the product which is the video.

STAGE 4 DESIGNING MINECRAFT

LESSON 5,6 & 7

Tools to be used: MINECRAFT

Description:
At this stage, the students use gamification to solve the real-world problem. Students are given autonomy to do what they want to do. Minecraft is like their on world (artificial world), and they have the issues to solve in their world which is the stray animal issues.

Everyone has the responsibility to design the building, character, dialogue, story line, study the best material.

Thus, this supports the concept of 21st century learning where the element of collaboration is installed. As far as teaching English as a second language is concerned, designing Minecraft is similar like designing the essay. Thus, the lesson is more meaningful as the students do not really realize that they actually have come with with something similar with the essay.

This lesson creates the value of owning the world, where everybody is responsible to take care of the world, and solve any issues that exist in this world.

As a result, some of the students might adopt the cat as their own initiative not being asked by the teacher.

STAGE 5 : SHARING EXPERIENCE

LESSON 8

Tools to be used: SKYPE

Description:
This is the stage that students spread the awareness among people around the world. It is a sharing session of what they have done in this project. Therefore, we will see the video of our students skype with the other pupils in other countries such as Indonesia etc. Students need to share a lot about their awareness campaign that they do in this project. This stage encourages the students to believe that they can be a change maker.

Why are they important to education?
Happy-Go-Kitty Minecraft is important as it has made education interesting and fun for everyone. Minecraft is useful for children because it simply encourages the advancement of imagination, critical thinking, course, and coordinated effort—all of which emerge as the less-substantial, non-scholarly advantages that Minecraft gives. These fundamental abilities will give kids the lift required when they work their way towards succeeding in school and future professions.

"Survival mode," where different enemy turn out around evening time and assault players, is one example of the how Minecraft empowers critical thinking. Players are involved into different conditions and should rapidly make sense of how to discover and construct cover, create weapons, and gather food so as to endure. This technique becomes possibly the most important factor in a major way here, as each Minecraft "day" endures a meager 10 minutes, which means players need to think and react quickly in the stage that they need to remain alive.

As far as teaching language is concerned, the agreement for utilizing games in a second language lesson can be found in the way that students give a great deal of advantages through games. In this framework, it gives the autonomy for the students to construct their own game. It was guaranteed by many experienced scholars that games are instructively important. A few reasons are referenced by Lee as in the following (Lee, 1993): games allow to escape from peculiar daily practice, yet they are significant as far as inspiration and difficulties. Also, games give consolation to connect and convey effectively for students and perpetual quality to carry on the effort of learning and make a context to utilize the language effectively, diminishes anxiety, and enable students to learn in a relaxed and fun condition.

Advantages
Minecraft is unique in the sense that there is no real way to "win." Players must choose for themselves what they need to escape their time in the game. Would they like to gather assets and manufacture cool stuff? Would they like to unite as one with their colleagues and trash a manager? It’s up to them!

Such autonomy—and the encouraging feedback that comes when they mark off the following objective on their picked way—constructs self-assurance and gives kids a chance to feel like they are accountable for their own destiny, an inclination that can now and again be inadequate in the standard loaded genuine world.
Games have numerous benefits for both language educators and its students. They bolster learning the target language when students are associated with the games and have a fabulous time without seeing that they are learning the target language, and besides it is a joy for the instructor that he introduces the language in a pleasant environment which makes the activity ground-breaking. McCallum (1980) highlights this fact by stating that games naturally revitalizes learners’ intrigue, an appropriately presented game can be one of the most astounding techniques. Another bit of leeway of utilizing games in teaching language is to avoid from the unpleasant moments. In a language learning condition, comfortable condition ought to be given. Presently, games are worthwhile since students don’t feel any tension and their positive emotions increment and their self-assurance improve in light of the fact that they are not terrified of being rebuffed or reprimanded while they are utilising the language freely (Crookal, 1990).

**Kitty Go Happy Minecraft Development, Design & Process**

The process of the invention encompasses 5 stages: (Analyse, Design, Development, Implementation, and Evaluation stages). The needs analysis stage was conducted on SMK Kubang Kerian 1 students to investigate the students’ needs and their problems in learning English language. Followed by designing stage in which all the learning objectives for Form 4 were constructively aligned and meet the requirement of the international language standard (CEFR-Common European Framework Research). During the third stage (development stage), the course contents and assessment were prepared, followed by the website development and pilot test. In the implementation stage, the framework was used as the main additional platform in assisting the English language selected for Form 4 learners in SMK Kubang Kerian 1. In order to get the feedback of the users for the betterment of this invention, evaluation stage was implemented where the course was evaluated by the students. The content of the framework was always upgraded based on the current advancement of technology as well as the users’ feedback.

**Commercial Value**

Minecraft can oblige the students who are glad imparting in the virtual communication, both recorded as a writing and orally. It can likewise work for individuals in the industry who are needing English since it offers fun English learning environment. At long last, this innovation can be elevated to schools and universities for understudies to learn English.
The Self-Care Guide for Stress Management Strategies mobile application module

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Highlights
The Self-Care Guide for Stress Management Strategies mobile application module is developed by employing Emotional Intelligence and Conflict Management Styles theories to address stress management issues among students. The app module facilitates users in managing stress in providing effective-proven tips and techniques by combining online and offline activities, and a podcast in one accessible mobile application. The strength of this handy app lies in delivering real-time information, and as a teaching aid in health related-subjects to enhance students’ comprehension skills. The Ministry of Education can use this app to formulate new policies in dealing with stress management issues and programmes.

Keywords: mobile apps, stress management, podcasts, health, innovation
MOBILE LEARNING FRAMEWORK: GAMIFICATION OF LANGUAGE TEACHING AND LEARNING

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Highlights: Digital technology has increasingly engaged remarkable public attention and this has contributed to the formalisation of media use in teaching and learning. Studies have suggested that guided usage of mobile devices in learning is necessary. This framework suggests appropriate web applications that match with a particular language skills development (listening/speaking/reading/writing) and functions as a guide to assist in students’ mobile learning.

Keywords: English language, gamification, guided mobile learning, intervention design

Introduction

The development in global Information and Communication Technologies (ICTs) has propelled recent advances in media use in teaching and learning (Hafner & Miller, 2011). This includes the formal integration of various digital platforms in English language classroom. In this case, quoting Mattheos et al. (2010) would be right as he agreed that educational methods must be dynamic and continuously adapted to an ever-changing social environment. As information and communication technology has been a serious element of tertiary teaching and learning, one particularly important trend we have recently witnessed with regard to the use of ICT is the increasing reliance on mobile-connected devices not only in daily tasks, but also within professional and educational environments (Kosalka & Nitobe-Abie-Kuswani, 2010). Given that situation, there are also concerns regarding the usefulness of mobile usage in language learning. Woodcock et al. (2012) for instance believed that students always use their phones more for playing games and other leisure activities than for learning. Hence, this particular paper will discuss a possible mobile learning intervention design for English language learners that will benefit them in their language learning and performance.

As in Universiti Malaysia Kelantan (UMK), the learners are English as a second or third language speakers. Most of the learners hail from a background of a number of different first languages spoken in Malaysia such as Malay, Mandarin, Tamil, Iban and Kadazan-Dusun. The learners’ English proficiency ranges from low to medium with a few proficient users. Scaling them according the Malaysian University English Test (MUET), majority of the learners scored Band 3 and above suggesting average level of English language proficiency while there are some who scored Band 1 and Band 2. Overall, it can be concluded that in terms of their language proficiency, the learners can understand any forms of instructions well and can follow the lessons satisfactorily.

All UMK learners are provided with an iPad each. This is part of an effort by UMK to drive the institution towards Industrial Revolution 4.0 that envisions new era society of cyber-physical systems, the Internet, cloud and cognitive computing (Herman, 2016). In line with that, the education system in UMK is also working towards providing 21st century skills needed by the learners to survive namely collaboration, creativity, critical thinking and communication. In attaining the mentioned skills, there is no other way other than embracing mobile learning as through it, the incorporation of the skills is seen as possible. Mobile learning encourages learners’ collaboration through various learning application available be it inside or outside classroom. Language learners can also use mobile learning platform to sharpen their creativity and critical thinking skills through myriad of reading materials and information that they can get at their fingertips. Finally, mobile learning irrefutably would enhance learners’ communication skills through the usage of communication devices such as smartphones and tablets in language lessons.

Description of the Innovation

The innovation proposed is a framework that integrates the existing English language syllabus to possible online English language learning applications specifically according to language skills such as listening, speaking, reading and writing. The framework shows how the existing syllabus can be integrated with online learning apps that were selected with any changes and modifications made to the syllabus. This will allow the instructors to continue teaching based on the required syllabus for that particular semester or year, while using technology, in form of apps and mobile phones inside and outside the classrooms.

Background of the innovation

This innovation is proposed due to the vacuum in the understanding on whether or not guided intervention in mobile learning would effect in an effective language teaching and learning. A number of studies have been conducted on the mobile intervention in language learning and its effectiveness. In general, scholars are divided into two opinions; one that favours mobile learning and believes it has positive impact on learning and second opinion that opposes the aforementioned notion of understanding. Among the studies conducted is the study by Wilmer et al. [2017] that believed that the body of empirical evidence demonstrating tangible effects of mobile devices on memory and knowledge is limited. Earlier, Spampinato et al. (2011) argued that with the close relation to technology, people are remembering less actual information and instead commit to memory where such information can be found. As Wilmer et al. (2017) suggested, when people turn to mobile devices, they generally learn and remember less from our
experiences. There are also notions that consider mobile devices in learning correlates with more intuitive but less analytic thinking as proposed by Barr et al. (2015). Meanwhile a more extreme view on mobile learning such as the one proposed by Beland and Murphy (2014) contended that enforcing mobile phone bans in school is associated with better academic performance. Junco (2012) made it clear that the usage of social media in learning is negatively correlated with academic performance as it is used more for socialising than learning.

As opposed to the above mentioned views on mobile learning, there are also studies that support mobile usage in classrooms. As mentioned by Harley et. al., (2007) text messaging on academic matters between learners and instructors gave learners a sense of belonging and also made them feel they would do better academically. Yu (2012) believed smartphones have a huge potential to be used as a learning tool in higher education as it can be used to access thousands of materials and there are a lot of inexpensive but useful learning applications that can be integrated in learning using smartphones. As opposed to traditional teaching, mobile learning can benefit learners in many ways as suggested by Goh and Kinshuk (2006) such as games and competition in learning, classroom learning, laboratories learning, field trip learning, distance learning, informal learning, pedagogical and learning theory, learning and teaching support, mobile evaluation, requirements, and human interface. A number of these attributes can be associated with language learning. Talking about 21st century learning where collaboration is involved, Yu (2012) continued that digital technologies such as blogs, wikis, and interactive websites have ushered in a whole new era of information sharing and collaboration where these could be furthered when applied in mobile learning context.

Therefore, a framework that integrates mobile learning apps and the existing syllabus was created and tested and the results showed that students' performance in language is improved. Hence, this innovation, which is an idea of integration between language learning apps and language skills is created.

The importance to education

This innovation is important to the field of education as it fulfills what is required for 21st century learning.

The past literatures on 21st Century learning, the mobile learning concepts as well as findings on guided mobile learning have been looked into to provide insights on current surrounding issues. Understanding this would assist in developing a good gamification strategy.

21st century learning has become an integral part of educational thinking and planning for the future (Nichols, 2018). In regard of this, educational communities have been formulating ways to train learners for the future. This includes the shift from teacher-centred to student-centred learning and from subject-based to problem-based approach. According to Nichols (2018), the role of education in the 21st century is to prepare students to become active, successful, and contributing members of society. 21st century learning thus considers a number of aspects that demand the instruction in a particular lesson to be student-centred. This means that education should be less that a teacher giving a lecture about a topic, rather learners are given tasks to be solved. Solving problems thus should involve students acquiring proper information that can be done through the incorporation of technological devices and the Internet in classrooms.

Other than that, 21st century learning also concerns collaboration between learners (Nichols, 2018). This is seen as a crucial factor that prepares learners for future survival where they will have to work with people from different cultures and backgrounds in the borderless world and that they need to have proper skills and knowledge about the world to do so. The implementation of mobile learning for instance is in sync with this particular idea of 21st century learning where learners can access myriad of knowledge about cultures and nations, world's problems and solutions to be discussed in a problem-based classroom. From a language learning perspective, the idea of collaborative learning is sensible as language is a tool to share ideas and opinions while it serves to bridge people of different background.

Advantages of the Innovation

Given the extensive debate on the strengths and weaknesses of mobile learning, the discussion mainly hovers around the idea of advantages and disadvantages. However, there is a lack in discussion on how proper guided mobile learning intervention can benefit learners as asserted by Kukulska-Hulme as cited in Ng, et al (2016) that the possible influence of mobile devices on education and their impact is still unclear and is an evolving field of study.

Hence, some researchers emphasized on the idea of guided mobile learning intervention. Barrs (2011) for instance recommended that detailed guidance and explanation on how to use smartphone appropriately in classroom settings is essential if meaningful learning is to take place. With the same understanding, Ng, et al (2016), found that facilitating the usage of smartphone is crucial and the findings recommended future studies should focus on ways to facilitate learners’ intentional behaviour towards the use of smartphones so that they will develop the capacity to use this device to assist their learning processes. This innovative product proposes a potential guided of mobile learning intervention module to enhance learners’ language performance.

The development of today’s technology has created a generation of students who are thirsty of the richness of resources on digital media. Moving forward, instructors, especially language instructors should be aware of recent changing trend and adapt the content delivery method to suit the intended audience. Nevertheless, studies (Ng et al. 2016; Barrs, 2011) have suggested that the presence of a comprehensive guide for mobile learning is a necessity to ensure that all mobile interventions are not merely creating a fun environment, but assist in effective delivery of the course contents.
Commercial Values
The innovation is highly commercial as it is not just beneficial for university language teaching and learning, but also any other institutions that have English language subjects, be it schools, colleges, polytechnics and matriculations. The mobile learning framework can be printed as a module or distributed in CDs to schools and colleges as a guide for language instructors to implement the integration of the language learning apps to their English language syllabus.

Acknowledgement
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References
GoFIT: An Integrated Online Platform for Free Independent Traveller- An aid in tourism classroom

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Highlights: Go Free Independent Traveller (GoFIT) is an integrated online platform created to ease tourism students in mapping out travel packages. GoFIT offer a valuable service to students in creating specially-priced travel packages for Free Independent Traveller (FIT) by integrating most required travel apps needed in planning travel itineraries such as accommodation, transportation, navigation, meals and safety. GoFIT has elevate the value of creating travel packages into a better managed process which indirectly help to improved student’s knowledge and reduced student’s learning time.

Keywords: Free Independent Traveller (FIT), Integrated platform, Learning material & Travel Packages

Introduction
GoFIT is an integrated online platform created as a teaching material for Tourism Management Courses. This platform shares all information using cloud computing technique to ease students in mapping out travel packages. Its incorporated most required travel apps for Free Independent Traveller (FIT) in trekking around the world, find transportation services, book accommodations, navigate to places of interest and ensure safety and security while traveling.

GoFIT can be a key tool to students in understanding the concept of developing a travel package. Traditionally, the current pedagogy method and online portal required much student’s time to surf different websites in order to compile the required information in order to develop travel packages. With GoFIT, it has elevated the value of creating travel packages into a better managed process which indirectly help to improve student’s knowledge and reduced student’s learning time. Additionally, GoFIT can make the learners attentive and motivated in using an interactive learning material.

The development of GoFIT not only help the students, but it can also help free independent traveler (FIT). Nowadays the number of FITs is rising all around the world (Skift, 2013) in both developed and developing countries (Tsaur, 2010) which is reflected in the report findings. More than one in six people (15%) chose to go on holiday by themselves in the past 12 months (Association of British Travel Agents, 2018) The growing trend is due to the improved technology and increase numbers of low-cost carrier that enable FITs to travel around the world with more ease, greater control and confidence alone (Tsaur, 2010).

FIT behavior and demand are quite different than general one. FIT seek to explore their chosen destinations on their own and at their own pace with an emphasis on enjoying the local food, architecture, history, and culture. They don’t want the experience of taking a brief look at everything in a hurry, as happens when you are part of a tour group. The so-called FIT often struggles to get around when travelling, compared to the mass tourists, although they have more free time at their disposal (Tsaur, 2010). Thus, we believed that FIT is the way by which our ancestors travelled many years ago – independently. Today, we can do the same, but with a world of informational resources and planning tools like GoFIT that were unavailable to those in the past. This is the world of FIT, or free independent travel.

Kindly search our GoFIT travel information at https://gofitclicks.wixsite.com/home for further information.

Reference no for copyright/ pattern: LY2019000233.

Figure 1: User Interface of GoFIT apps
Figure 2: Elements in GoFIT apps

References
S.O.A.R MODEL: SHIFTING FROM “CLASSROOM MANAGEMENT” TO “CLASSROOM LEADERSHIP”

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Highlights: S.O.A.R Model has been successfully utilised within an organisation to facilitate change and development in enhancing students’ motivation, engagement and performance. It is an adaptation of the SWOT Analysis where the main difference resides in the factors approach; the SOAR Analysis removes the negative factors (Threats, Weaknesses) and replaces it with the positive factors (Aspirations and Results). In every element of leadership, there is some element of management. However, leadership brings that out, not management. Thus, we believed the term “classroom leadership” needs to be more dominant in academicians conversations about teaching and learning.

Keywords: S.O.A.R model, S.W.O.T, appreciative inquiry, classroom management, leadership

Introduction
The process of students’ learning in any classroom environment involves the acquisition of information, interaction with that information through activities, and the creation of new knowledge. The classroom provides a learning environment that becomes the context for knowledge acquisition by establishing conditions that are conducive to learning. The structure of this environment determines the overall effectiveness of the learning process (Caffarella, 2002). The online learning in the classroom may change the nature of students’ motivation, engagement, and performance. A student’s need for self-motivation and taking responsibility for his or her class participation and assignment completion may be greater with an online classroom. Some students use assignment deadlines and grades as their source of motivation (Martin & Calabrese, 2011).

Moreover, the online student’s engagement in the class is usually encouraged through the use of discussion boards and asynchronous interactions with his or her instructor. Performance in an online classroom environment is based on product created by student’s, whether this is accomplished through group activities, online assessments, or written assignments. Students are provided feedback from their lecturer, and the level of feedback can vary from a letter grade to the number of points earned, or the inclusion of developmental comments (Hassan & Rasiah, 2011). Depending upon the level of involvement by the lecturer and the student, the online classroom has the potential to become very mechanical in nature and it may become easy for a student to experience a sense of disconnection from the class and/or the lecturer.

Background of the study
S.O.A.R has emerged as an effective and flexible strategic framework that releases an organisation’s energy, creativity, and engagement. This framework accelerates strategic planning sessions and processes by using Appreciative Inquiry (AI) as a guiding approach to examine the strengths, opportunities, aspirations and measurable results; imagine the most preferred future; create innovative strategies, plans, systems, designs and structures; build a sustainable culture; and inspire organizational stakeholders to S.O.A.R (Stavros & Hinrichs, 2007). S.O.A.R Model has been successfully utilised within an organisation to facilitate change and development in enhancing students’ motivation, engagement and performance. It is an adaptation of the SWOT Analysis where the main difference resides in the factors approach; the SOAR Analysis removes the negative factors (Threats, Weaknesses) and replaces it with the positive factors (Aspirations and Results). SOAR framework aims to follow a strategic planning method based on the expansion of Opportunities and Strengths to achieve Results targeting the management Aspirations. The philosophy behind the SOAR framework is the appreciative inquiry which used to formulate plans aligned to the premeditated vision. The analysis assimilates the collective ideas and encourages collaboration within the organisation (Khavarian-Garmsir & Zare, 2014; Stavros & Cole, 2013).

Table 1: Comparison between SWOT model and SOAR approach

<table>
<thead>
<tr>
<th>SWOT analysis</th>
<th>SOAR approach</th>
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<tbody>
<tr>
<td>Analysis-oriented</td>
<td>Action-oriented</td>
</tr>
<tr>
<td>Weakness &amp; threat-focused</td>
<td>Strength &amp; opportunity-focused</td>
</tr>
<tr>
<td>Competition-focused—just be later</td>
<td>Possibility-focused—Be the best!</td>
</tr>
<tr>
<td>Incremental improvement</td>
<td>Innovation &amp; breakthroughs</td>
</tr>
<tr>
<td>Top-down</td>
<td>Engagement of all levels</td>
</tr>
<tr>
<td>Focus on analysis — planning</td>
<td>Focus on planning — implementation</td>
</tr>
<tr>
<td>Energy-depleting—There are so many weaknesses and threats!</td>
<td>Energy-creating—We are good and can become great!</td>
</tr>
<tr>
<td>Attention to gaps</td>
<td>Attention to results</td>
</tr>
</tbody>
</table>

DeTAR Putra, Universiti Malaysia Sarawak
Student engagement, however, is an area of concern for many educators, as students with higher levels of engagement and motivation tend to learn more than their less motivated or engaged peers. Research into strengths-based approaches shows that people working from their strengths display higher levels of motivation, confidence, satisfaction and competence as well as they tend to learn and retain information more easily (Stratton-Berkessel, 2010). Thus, this project aims to move students from the common deficit-based, teacher-dependent mind-set to a more self-reliant approach focused on using their strengths to learn more effectively. In addition, it is also useful, especially for teachers or lecturers to use a positive discourse to foster improved student attitudes, increase interaction between students and increase students’ engagement with their learning. Hence, it may facilitate students’ adopting a set of appreciative agreements, or commitments around what they would do individually and collectively, as a class to achieve their goals.

Significance of shifting from Classroom Management to Classroom Leadership

There are three general types of classrooms: (i) the unmanaged classroom, which allows chaos and confusion to flourish; (ii) the managed classroom, which allows routine learning but often without student ownership; and finally (iii) the intentionally led classroom, which nurtures self-motivation and self-discipline, produces engaged and synergistic learning, and ultimately empowers students (Walsh, Chang, & Tse, 2015). Classroom management as the essential teaching skill and effective for teachers to minimise misbehaviours and reduce the number of disturbances will also create learning environments that are safe for students’ intellectual and emotional growth (Cangelosi & Sonnemann, 2017). The classroom management design included understanding between environmental, interpersonal and intrapersonal factors; health promoting approach to creating safe, supportive and caring environments; inclusiveness, which caters for different needs, recognizing and celebrating diversity; placing students at the centre of the learning and focusing on their social, emotional and academic needs (Egeberg, McConney & Price, 2016). By enhancing strength, opportunities, aspirations and result oriented (S.O.A.R) model into classroom management, it shifts from classroom management to classroom leadership.

Leadership consists of actions that help the group to complete its tasks successfully and maintain effective working relationships among its members. For any group to be successful, both task-leadership actions and group maintenance-leadership actions have to be provided (Maier, 2009). It is important to note that any member of a group may become a leader by taking these necessary actions (i.e., the teacher is not necessarily the leader), and the various leadership actions may be provided by different group members (i.e., the teacher may decide to share various aspects of leadership with class members). A leader in the classroom could be defined as an individual who can guide students through the learning process in a way that students can understand and use the knowledge they have acquired through the assistance of the teacher (Thomas, 2014). In this day and age of unmotivated, entertainment-driven students, it is hard to find classroom leaders who can achieve this.

Values of classroom leadership

Classroom leadership has an inspirational leader truly use their knowledge and sense of people’s’ basic needs to build their effectiveness. The effectiveness of classroom leadership has six keys to motivate people and performance excellence (Day and Sammons, 2014). The six keys are safety, success, love and belonging, freedom and independence, fun and enjoyment, and valued purpose. By having classroom leadership, the process of the lecture will be easier. Firstly, students lead group projects which the project-based learning will add a kinaesthetic element to the digital learning environment and help learners contextualise the material. Secondly, students lead conversations for everyone in an eLearning environment has something to offer or a question to pose, and both are equally valuable in elevating the experience of the group. Lastly, students lead through accountability and it is difficult to succeed in remote, online learning programs without autonomy and independent motivation. It takes great self-knowledge to self-motivate and be accountable; no leader can succeed without these qualities. This is the essence of leadership as well: a vision, a compelling drive to achieve, and a willingness to explore strategies to pursue that goal.

Leadership consists of actions that anyone can acquire. Responsible leadership depends upon flexible behaviour, the ability to diagnose what behaviours are needed at a particular time for the group to function most efficiently; and the ability to fulfill these behaviours or to get other members to fulfill them (Daveston & Keenanagh, 2006). In addition, educational research indicates that there are five core behaviours that classroom leaders need in order to help students to learn. These behaviours consist of clear lessons, variety in instruction, task orientation of the teacher, student engagement in learning as well as the high success rate of students (Thomas, 2014). Therefore, teachers should know that, generally, groups function most effectively when leadership tasks are shared among group members. However, most students were accustomed to being in classes where the teacher plays all of the leadership roles; if we want students to play some of these roles, we must permit them to do so, and perhaps guidance in how to best take on these roles. When teachers neglect leadership and do not provide leadership themselves or invite students to take on leadership roles, students may themselves elect to play informal (and frequently inappropriate) leadership roles in the classroom, simply to pull the individuals together as a group.

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References
AUGMENTED REALITY FOR THE SPECIAL EDUCATION CLASSROOM

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Highlights: A special app utilising Augmented Reality (AR) for the special kids to learn. This helps to develop educational and entertaining app to let them have more fun while learning.

Keywords: Augmented Reality, Colouring Book, Edutainment, Quality Education, Reduce Inequality, Special Education.

Introduction

The objective of this project is to develop educational and entertaining apps intended to special kids' benefit and design an Augmented Reality (AR) colouring book by using AR technology and 3D modelling to attract special kids’ attention on the study. The AR app integrates the 3D virtual objects into the real world. The kids learn to colour the animal pictures to be more fun and interactive. Also, able to help kids learn through edutainment approach and to enhance the attention span, eye contact, sitting tolerance, follow instruction, interest and finishing the task of kids.

Objectives

Enhance the attention span, eye contact, sitting tolerance, follow instruction, interest and finishing the task of kids. Let kids bring their favorite animals to life with a unique blend of traditional colouring and virtual interaction. Transform their coloured animal into a virtual animal that complete with animation and sound. Allows kids to practice and express their creative skills. Allows kids to gain interest and attention of kids making creative activities.

Novelty

AR live colouring combines the real 2D world into the 3D virtual world with this cutting-edge AR technology. Play with animal characters in the book as bring them to life. See the animal characters come alive as kids colour, the kids will be amazed. Learn the animals through entertainment.

Usefulness and Application

AR has an ability to catch special kids’ imagination and promote attention, within safe and fascinating environments. AR for special needs learning can be utilized at different speeds and locations, and never lose patience with the frequent repetition that many of these learners’ desire. Provide interactive and effective study environment for special needs learner to learn animals using AR approach. This makes special education and therapy cost and time effective, efficient and accessibleforall. The special needs learner could improve abilities in attention span, eye contact, sitting tolerance, follow instruction, interest and finishing the task. Support national and international policies.
Market and Commercial Potential
AR colouring book
Mobile app
Copyright materials

Acknowledgement
We are grateful for the Center for Excellence and Academic Development and the Faculty of Creative Technology and Heritage, Universiti Malaysia Kelantan (UMK) giving us the opportunity to participate in the International University Carnival on E-Learning 2019 (IUCEL 2019).

References
Di Malaysia, Kementerian telah mengenal pasti kemahiran abad ke 21 dengan konteks tempatan, dapat menyediakan warga Malaysia yang boleh bersaing pada peringkat antarabangsa. Untuk itu, pendidikan bermatlamat untuk melahirkan pelajar yang semibang, bersemangat ingin tahu, berprinsip, bermaklumat, patriotik, serta mempunyai kemahiran berfikir, komunikasi serta bekerja secara berpasukan.

Universiti harus menyediakan peluang pendidikan dengan kurikulum berasaskan pelajaran berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan berlandaskan 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Hipotesis
Kaedah pembelajaran MOOC Falsafah Ilmu dapat meningkatkan kefahaman pelajar dalam memahami kursus yang dipelajari dengan lebih baik.
Kaedah pembelajaran MOOC Falsafah Ilmu dapat meningkatkan kefahaman pelajar dalam memahami kehidupan dengan lebih baik.
Kaedah pembelajaran MOOC Falsafah Ilmu dapat meningkatkan kefahaman pelajar memahami perkaitan antara kursus Falsafah Ilmu dan bidang pengajian yang dipelajari dengan lebih baik.

Kerangka Teori

Jadual 1 di bawah merupakan keputusan Pre-Test dan Post-Test yang telah dijalankan.

<table>
<thead>
<tr>
<th>NO</th>
<th>SOALAN</th>
<th>KEKERAPAN PRE-TEST</th>
<th>KEKERAPAN POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>Saya memahami dan dapat menghuraikan istilah ‘falsafah’ dengan baik.</td>
<td>-</td>
<td>0.67</td>
</tr>
<tr>
<td>2</td>
<td>Saya memahami dan menghayati kursus falsafah Ilmu dengan baik.</td>
<td>-</td>
<td>2.00</td>
</tr>
<tr>
<td>3</td>
<td>Kursus Falsafah Ilmu memberi manfaat yang banyak kepada kehidupan saya.</td>
<td>-</td>
<td>2.00</td>
</tr>
<tr>
<td>4</td>
<td>Pengetahuan mengenai Falsafah Ilmu memberi kesan yang banyak kepada kehidupan saya.</td>
<td>-</td>
<td>3.33</td>
</tr>
<tr>
<td>5</td>
<td>Kursus Falsafah Ilmu mempunyai kaitan yang rapat dengan kehidupan saya sebagai mahasiswa di UMK.</td>
<td>-</td>
<td>6.00</td>
</tr>
<tr>
<td>6</td>
<td>Kursus Falsafah Ilmu mempunyai kaitan yang rapat dengan bidang pengkhususan saya sekarang</td>
<td>1.33</td>
<td>6.00</td>
</tr>
<tr>
<td>7</td>
<td>Saya mampu menghubungkaitkan ilmu dan kemahiran yang dipelajari di UMK untuk menyelesaikan sesuatu permasalahan dalam kehidupan peribadi dan masyarakat</td>
<td>-</td>
<td>2.67</td>
</tr>
<tr>
<td>8</td>
<td>Kehidupan saya kini penuh bermakna di universiti</td>
<td>2.67</td>
<td>3.33</td>
</tr>
<tr>
<td>9</td>
<td>Saya kini mampu menghayati proses pembudayaan ilmu dalam kehidupan</td>
<td>-</td>
<td>2.00</td>
</tr>
<tr>
<td>10</td>
<td>Saya mempunyai tahap pemikiran kritis yang tinggi</td>
<td>0.67</td>
<td>2.00</td>
</tr>
<tr>
<td>11</td>
<td>Kursus Falsafah Ilmu patut diajar kepada pelajar universiti.</td>
<td>3.33</td>
<td>6.00</td>
</tr>
</tbody>
</table>
Pensyarah saya berjaya melaksanakan pengajaran secara berkesan sehingga saya mampu menguasai kursus Falsafah Ilmu dengan baik

<table>
<thead>
<tr>
<th>No</th>
<th>12</th>
<th>-</th>
<th>0.67</th>
<th>10.00</th>
<th>58.67</th>
<th>30.67</th>
<th>-</th>
<th>-</th>
<th>9.33</th>
<th>72.00</th>
<th>18.67</th>
</tr>
</thead>
</table>

Jadual 1 menunjukkan keputusan dan kekerapan bagi Pre-Test dan Post-Test. Jadual ini menunjukkan peningkatan jumlah kekerapan kepada saizan Post-Test. Ini membuktikan bahawa penggunaan MOOC Falsafah Ilmu sangat berkesan dalam proses pembelajaran di UMK. Oleh itu pembelajaran secara maya ini, haruslah diteruskan bagi meningkatkan kefahaman pelajar terhadap kursus Falsafah Ilmu.

**Penghargaan**

Pasukan pengkaji ingin merakam penghargaan kepada semua pihak yang terlibat dalam menyelakap penyelidikan ini sama ada secara langsung atau tidak langsung. Pertama, ucapan terima kasih kepada Kementerian Pendidikan Tinggi (KPT) Malaysia bantuan kewangan yang diberikan oleh pihak KPT. Setinggi penghargaan kepada pihak Universiti Malaysia Kelantan (UMK) terutamanya Research Management and Innovation Centre (RMIC) atas geran penyelidikan Skeme Grant Penyelidikan Jangka Pendek (SGJP) berkod: R/SGJP/A04.00/00999A/002/2018/000531 yang diberikan dengan jumlah sebanyak RM 5,000. Penyelidikan ini nyata dapat dilaksanakan dengan jayanya atas bantuan RIMC dalam membiayai pengendalian geran penyelidikan SGJP yang diperoleh. Tidak dilupakan juga kepada Pusat Pengajaran Bahasa dan Pembangunan Insaniah (PBI) atas kemudahan dan ruang yang diberikan kepada kumpulan penyelidik dalam menyelakap geran penyelidikan ini.

**Rujukan**


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http://hepg.org/hel/article/184
READ AND WRITE (ME) QR CODE IN READING AND WRITING MODULE

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Highlights: Quick Response (QR) Code is no doubt a powerful tool that can be used to access the additional and interactive resources provided by the instructors from time to time. What makes Read and Write (ME) QR code in Reading and Writing Module so extraordinary is its fruitful, authentic and interactive resources that learners, not only can be used in the class, but also outside of the class, especially during their self learning time by utilising Read and Write (Me) Framework. The integration of mobile learning is hoped to optimise the use of technology in teaching and learning for future sustainability.

Keywords: Quick Response code, QR code, self learning time, mobile learning, reading and writing, teaching and learning

Introduction
Today, the traditional paper and pen method of lecturing is no longer applicable. Interactions, collaborations and teamwork are fundamental in creating an effective learning atmosphere. We are moving forward in transferring the knowledge to our students, the Z-generation. In implementing this, instructors all around the world are struggling to find innovative and engaging approaches in teaching and learning.

Mobile learning is not something new in Malaysia. Mobile learning a.k.a m-Learning according to Parsons and Ryu (2006), can be defined as the delivery of learning content to learners utilising mobile computing devices. On top of that, m-Learning in education is even more flexible than previous e-Learning applications (Georgiev, Georgieva, & Trajkovski, 2006). Such method has now evolved from using desktop to laptop, tablets and currently smartphones. Recognition of the rapid proliferation of smartphones today, we realise the needs of combining the use of smartphones in teaching and learning. The interest was especially to explore how smartphones can enhance and blend teaching and learning in tertiary level especially in English for Business Communication classes, particularly in the integration of QR code. QR code literally is being used in scanning a surface with a smartphone and getting a quick response in the form of website URL, email address, messages, multimedia content, instructions or other digital information that can be displayed on the smartphones and mobile devices (Ramsden, 2008; Sharma, 2013).

Initially, QR code is widely used in industrial and marketing but now it has been gradually adapted in teaching and learning. By embedding QR code, it will definitely of efficient and flexible for students to access the additional resources provided by the instructors from time to time. Thus, it can guide learners through self-assessment process. The use of QR code is hoped to stimulate the education revolution from conventional teaching and learning towards the digital technology engagement. By using QR code, an immediate platform can be provided for English language teachers and students to make use of their smartphones to explore, learn and understand the subject matter (English for Business Communication) in depth. QR code can help the teachers to expand their teaching methods, encourage knowledge and experience sharing and also enhancing their professional development. Whereas for the students, QR code can allow the students to engage in a fun and interactive lessons inside and outside classes. Besides that, it helps them to learn by examples and achieve better understanding of the subject content. All these can help to produce world-sensing generations who are future competent.

The QR code used in this module is at its best in enhancing and developing a unique, interactive and creative way of teaching and learning. The Gold Medal (Teaching Enhancement and Learning Innovation Carnival, 2019) and Silver Medal won (Creative & Innovative Carnival, 2018) have further proven that this module is no doubt a trustworthy and quality guaranteed product. Moreover, the publication of this module is supported by Centre for Languages Studies and Generic Development, Universiti Malaysia Kelantan. After the pilot testing and competitions, this module has been fine-tuned for the benefits of teaching and learning. Most importantly, this module is also designed based on the needs analysis of the students. The results gained from the needs analysis have indicated that a majority of the students choose to have technology and interactive activities integrated into Reading and Writing Module (Lena, Syakirah & Noor Syamimie, 2019). The aim of this innovation is not just to introduce the idea of embedding QR code in teaching and learning process in a larger scale via mobile learning, but also to optimise the use of technology in teaching and learning for future sustainability.

Acknowledgement
This project was supported by Centre for Languages Studies and Generic Development, Universiti Malaysia Kelantan. Special appreciation and thanks to all who have directly or indirectly contributed in this great work.

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PENGHAYATAN DAN KEBEKERESANAN PENGGUNAAN MULTIMEDIA DALAM KURSUS MAGNUM OPUS MELAYU DI UNIVERSITI MALAYSIA KELANTAN

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Kata Kunci: Multimedia, Magnum Opus Melayu, Pengajaran dan Pembelajaran

Pengenalan


Perkembangan teknologi pada hari ini tidak dapat disangkal lagi. Menggunakan teknologi dalam mengangkat karya klasik sastera tidaklah menolak cara tradisi menghayati dan memahaminya namun realitinya ia merupakan satu kaedah paling relevan dalam menarik minat pelajar untuk “lebih dekat” dengan karya sastera klasik terutamanya. Melalui soal selidik ini jelas membuktikan penggunaan multimedia mampu meningkatkan kefahaman dan memberi lebih kesan kepada para pelajar dalam proses pengajaran dan pembelajaran teks klasik sastera.

Analisis dan perbincangan

Responden adalah terdiri daripada 58 orang pelajar yang mengambil kursus Magnum Opus Melayu. Kursus ini memberi gambaran awal tentang tatkaitan karya agung secara umum. Tatkaitan umum itu kemudiannya diikaitkan dengan konsep karya agung dalam konteks dunia Melayu.Perbincangan seterusnya dihubungkan dengan ciri-ciri yang mengangkat karya-karya berkenaan sebagai Karya Agung Melayu. Berikutnya dibicarakan pula fungsi yang dimainkan oleh karya-karya Agung Melayu yang seterusnya diikaitkan dengan keunggulan atau kebijaksanaan akal budi bangsa Melayu yang tercermin dalam karya agung Melayu. Berdasarkan konsep karya agung yang dibincangkan terdahulu, maka ‘Karya Agung Melayu’ ialah karya yang melambangkan keunggulan daya cipta seniman, penulis dan pemikir bangsa Melayu dalam menggambarkan idealisme, nilai, pandangan hidup, adat, budi, kesedaran moral dan visi bangsa dan masyarakatnya melulu bentuk sastera dan seni yang tinggi nilainya sehingga...
kesan seni, budaya dan falsafah kekal sepanjang zaman dalam mina kolektif bangsa Melayu. Tamadun Melayu sepanjang zaman banyak sekali dibentuk dan diwaktuai oleh tradisi sastera ini.

Impak Kepada Pembelajaran Pelajar

Hasil kajian berkaitan keberkesanan penggunaan multimedia dalam kursus Magnum Opus Melayu dalam kalangan pelajar kesusasteraan Warisan UMK. Sebanyak 45.1 peratus responden sangat setuju dan setuju mereka suka menghadiri kelas yang di ajar dengan perisian multimedia. Manakala 5.9 peratus responden tidak pasti dan 3.9 adalah tidak setuju. Jadual 2.1 pula menunjukkan purata responden yang suka menghadiri kelas yang di ajar dengan menggunakan perisian multimedia adalah di skala 4, manakala penengah adalah di skala 4 dan mod adalah 4. Sisihan piawai pula adalah 0.7, ini menunjukkan jurang perbezaan tidak begitu ketara di skala 1 hingga 5. Kesimpulannya ialah responden lebih suka menghadiri kelas yang diajar menggunakan perisian multimedia. Ini mungkin boleh membantu pelajar untuk faham dan mengingati dengan cepat.

Sebanyak 51 peratus responden setuju mereka meminumi perhatian penuh dalam kelas yang menggunakan perisian multimedia. Manakala 33.3 peratus responden sangat setuju, 13.7 peratus pula adalah tidak pasti dan 2 peratus tidak setuju. Jadual 2.2 pula menunjukkan purata responden yang meminumi perhatian penuh dalam kelas yang menggunakan perisian multimedia adalah di skala 4, manakala penengah adalah di skala 4 dan mod adalah 4. Sisihan piawai pula adalah 0.7, ini menunjukkan jurang perbezaan tidak begitu ketara di skala 1 hingga 5. Kesimpulannya ialah responden lebih menampilkan perhatian dalam kelas yang menggunakan perisian multimedia.

Sebanyak 60.8 peratus responden sangat setuju mereka meminami karya agung yang telah diadapati menggunakan multimedia. Manakala 39.2 peratus responden setuju mereka meminami karya agung yang telah diadapati menggunakan multimedia. Jadual 2.3 pula menunjukkan purata responden mereka meminami karya agung yang telah diadapati menggunakan multimedia adalah di skala 4, manakala penengah adalah di skala 5 dan mod adalah 5. Sisihan piawai pula adalah 0.4, ini menunjukkan jurang perbezaan tidak begitu ketara di skala 1 hingga 5. Kesimpulannya ialah responden mereka meminami karya agung yang telah diadapati menggunakan multimedia.

Secara keseluruhannya, menunjukkan tahap keberkesanan responden terhadap penggunaan multimedia dalam kursus Magnum Opus Melayu dalam kalangan pelajar kesusasteraan Warisan UMK adalah di tahap tinggi iaitu sebanyak 90.2 peratus. Manakala tahap sederhana adalah 9.8 peratus. Perbezaan yang ketara antara tahap tinggi dan sederhana. Kesimpulannya ialah penggunaan multimedia adalah sangat berkesan dalam pembelajaran dan membantu pelajar untuk lebih memahami dengan lebih mendalam, menarik minat responden dan juga memberi kefahaman yang tinggi mengenai kursus yang di ajar.

Perisaian yang digunakan

https://pathbrite.com/course/PHi6-PMFPthw4/magnum-opus-melayu
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http://ecampus.umk.edu.my/feb2019/my/

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V.E.L.T - VOCABULARY ENHANCEMENT TOOL

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Keywords: Battle Text, E-Games, English, Vocabulary

Introduction
As an initiative to help students improve their English Language proficiency, the researchers have developed a combined vocabulary learning system by using Online Mobile Game, Padlet and Vocabulary Quiz. The researchers use mobile game applications known as Battle Text where it is a vocabulary match or competition with other players. The longer the letters, the higher the chance to defeat the opponent to become a winner. This competitive online mobile game encourages the players to keep on searching and pushing themselves in discovering new words with the longest letters to become a winner. New ideas of words can be generated while playing this game with the international opponents while simultaneously gaining interest in learning vocabularies.

By providing a platform specifically for this innovation, the Padlet, students are able to list down and share all the words they have used before. This platform enables students to interact with one another by asking the meaning of the word and open for discussion among them. Furthermore, lecturers can provide interesting articles or texts for student’s reading resources and purposes, to understand and memorize new vocabs which might be useful for Battle Text match later on.

Figure 1: Application of V.E.L.T Innovation Process
Tools and Platform Used in Vocabulary Learning

Background of V.E.LT Innovation Process

Having a strong grasp of English vocabulary is essential for anyone to communicate and write with confidence. The use of vocabulary should be taken seriously because it is a dictionary of one’s thinking in using the term and understanding the versus of the verse. The more vocabulary you acquire, the more you can get a good sense of communication. According to the Online News Daily (Berita Harian Online) 2018, Prof Datin Paduka Dr. Aini Ideris (Vice-Chancellor of University Putra Malaysia (UPM) noted that most graduates nowadays usually fail during interview session due to lack of confidence and fluency when it comes to communicating in English. This English competency issue is actually a common situation in every Public Institution in Malaysia. For instance, in University Malaysia Kelantan, the mastery of English language among some of the students from the faculty of Creative Technology and Heritage is below the expected level.

The Importance of applying V.E.LT. (Vocabulary Enhancement Learning Tool) into English lessons

Mastering vocabulary must be taken into account in having a good sense of communication particularly when we go abroad or when we have a conversation with foreigners from different countries. Students should understand the real meaning of the words used or learned. Having poor English vocabularies will create lack of confidence among the students which will eventually lead to communication avoidance. According to Gairns and Redman (2004)- “To fully understand a word, learners should not only know what it refers to, but also when the boundaries are separate it from words of related meaning (as synonymy, hyponymy, antonym, part-whole relations”). The role of instructor is very important in helping weak students to improve their mastery of English by encouraging, inspiring and ensuring they grasp the knowledge properly. However, since the Z and Alpha generations have mostly grow up with computer technologies and gaming, the use of traditional method in teaching and learning are insufficient to hold their interest in learning. Therefore, the researchers, using online mobile game learning approach strive to offer an effective, complimentary learning environment. With playing vocabulary games, students be able to recognize the word and remember. This statement is supported by Nation (2005) “Repetition is very important for Vocabulary learning especially when there is so much to know about each word” (p. 391).
Vocabulary Learning Process Through Battle Text Mobile Game.

Advantages of Using Battle Text in Vocabulary Lesson

The following are three advantages of using battle text in vocabulary lesson. First, it provides a fun and effective way for students (particularly weak students) to increase their English vocabularies. This is because learning through playing game requires high concentration which leads to the increase of focus compared to just listening to lectures. Second, as an instructional game that is well-designed, students can simultaneously build their problem solving skills while having fun throughout the process (MacKenty, 2006, Harris, 2009). Third, it is expected that when language instructors complement their lesson with battle text, both the students’ interest in acquiring new vocabulary and their confidence in using the vocabulary will improve.

Commercial Values in Innovation

For commercial values, the researcher found that there are 2 prospects which can be enhanced through V.E.L.T (Vocabulary Enhancement Learning Tool): Learning through V.E.L.T method, all students will be able to join and learn vocabulary. V.E.L.T through Gaming (Battle Text) can be elevated as an Institutional Competition which serves as a platform for exciting vocabulary discovery. This might eventually facilitate the urge for vocabulary mastery among students. The V.E.L.T method can be used by educational institution in Malaysia or across countries.

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Karen A. Milczynski (2010) Literature Review: Effectiveness of Gaming in the Classroom
Harris, C. (2009). Meet the New School Board: Board games are back – and they’re exactly what your curriculum needs. School Library Journal, 55, 24-26
BLUETOOTH SMART BASED ATTENDANCE SYSTEM FOR TEACHING AND LEARNING

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Highlights: Bluetooth technology is a wireless technology aimed at innovative applications in solving short range application such as the healthcare, fitness, beacons, security, and home entertainment industries. The technology makes use of electronic tags to facilitate automatic wireless identification, with a Bluetooth Smart enabled device. We are attempting to solve the problem of students’ attendance monitoring using a Bluetooth smart based system. The objective of this application of Bluetooth smart based system is to improves student attendance time taken during manual attendance, minimize human errors and provides administrators the statistics of attendance scores for use in further managerial decisions.

Keywords: Bluetooth technology, smart attendance system, Monitoring system, wireless application

Introduction
The proposed Bluetooth Smart Based system used mobile device with Bluetooth technology to detect MAC address stored in student’s mobile device. Every student requires to register MAC address before he/she enrolled the class. When a student attends the lecture, a MAC address in the mobile device is associated with the student database entry. Therefore, every time a student carries his/her mobile device and is attending the lecture the entries will be entered into the database with the time stamp as the lecturer moves around the class and the application detects the mobile device. Also, the application is configured to detect mobile device only within a specific range in order to avoid detection of mobile device that are outside of the classroom. The lecturer or administrator can use queries provided by the application to obtain more information about the attendance of a specific student or the entire class. Additionally, the lecturer can grade students based upon their attendance for a specific course and can also generate reports weekly, monthly or for an entire semester. It will be beneficial for the students as well as the lecturers of the respective universities and colleges as with the advancement of this system they can utilize their lectures in a best manner. Therefore, we can conclude that in the future, we can consider Bluetooth Smart Based Attendance System as a good option in near future to meet the need of effective teaching and learning tool in the era of Education 4.0.

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References
INTERACTIVE APPROACH IN LEARNING WASTE MANAGEMENT AND POLLUTION PREVENTION COURSE

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Highlights: This article highlights the interactive approach used in learning Waste Management and Pollution Prevention Course. The interactive approach using Pathbrite as an e-learning platform gives a fresh and different style of learning process for students through participating in created activities such as educational games and animation videos.

Keywords: interactive, Pathbrite, e-learning, educational games, animation videos

Introduction
In this millennium, technology has become a very crucial part of our daily life. The use of technology is not only for entertainment and communication, it is also has become one of the important platform in teaching and learning. Nowadays, E-learning has become an important part of the education system and has changed the view of teaching and learning process as a whole. Advancement in internet and multimedia technology is the basic enable for e-learning. E-learning is the process of extending learning or delivering instructional resource sharing opportunities, to locations away from a classroom, building or site, to another classroom, building or site by using video, audio, computer, multimedia communications, or some combination of these with other traditional delivery methods (Wani, H. 2013). There are diverse ways of classifying the types of e-learning. Alqahtani (2011) divided e-learning into two basic types, consisting of computer-based and the internet based e-learning. There are many e-learning platforms now in the market. This course has chosen Pathbrite as an e-learning platform to enhance students’ better understanding in an interactive approach. Through Pathbrite, instructors enable to assign videos, audio recordings or any kind of digital artifact of student experience; assess and keep track of the student submissions on their teacher dashboard within Pathbrite (Anderson, 2013). These types of digital portfolios are the perfect fit for project based or blended learning.

Description of product development
In Waste Management and Pollution Prevention Course, student will be introduced with management concepts in handling waste and pollution especially in Malaysia via conventional lectures. Apart from that, lab conducted are taught for in order to give skills and experience for students in the field. In this e-learning platform, this course are divided into 3 parts (Figure 1) consisting of 1) course introduction using animation videos, 2) knowledge and information for the course content including some extra reading notes and 3) activities including interactive discussion, projects and quiz.

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

Activities such as interactive discussion through padlet platform give real time interaction between students and instructor. Students are given task in terms of projects in the field and required to report their progress through this platform. Quiz is also created as one of the activities that will help to evaluate the students’ understanding on the topics in Waste Management and Pollution Prevention course. Besides that, quiz is also used in this course as one of the educational games and activities to help students learn and understand topics related to law and regulations. This kind of educational games will assist the students to have better understanding and familiar with the law and regulations related with the course learned.
The importance of product development.

Through this development of platform, the awareness of conserving the environment and curbing the pollution could be widely inculcated among the learners. They will explore and discover virtually the impacts of global waste management via the you-tubes and online documentary in their own spaces. The better visualization of the content keeps learners active during the learning process as it enhances human ability to understand and process information [Serio et al., 2013]. Apart from that, the development of this product through Pathbrite also known as e-curriculum vitae will enable the future employers to identify and have a full view of the entire contents appertaining to Waste Management and Pollution Prevention. Hence, through the assignment and scoring marks from learners’ assessments stored in this platform will conjure up the level of their knowledge in waste management and seriousness to the employers prior to hiring them.

Advantages of the product development towards education and community

Based on the conservative methods applied in Waste Management lectures, learners had difficulty in visualizing and applying knowledge practically. Hence, in order to sustain the learning process of this course some enhancement is required. In this paper, it is proposed to incorporate virtual objects when blended with real world. It is aimed to amalgamate entertainment and study by providing immersive learning experience to learners. This will assist them to recognize each types of waste and understand the management for each waste. The expectation with this enhancement is to impart a great deal of knowledge and better learning outcomes for Waste Management and Pollution Prevention. Eventually managed to educate the learners to pursue Green Life Style and help minimize the impacts of Climate Change globally.

Commercialization potential of the product

Private institution such as private colleges or pre-schools. Personal usage for private tuition or personal teaching by parents at home.

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We would like to thank you to Pusat Pembelajaran dan Pengajian, Universiti Malaysia Kelantan (UMK) and Faculty of Earth Science, UMK for supporting our journey in promoting virtual learning of Waste Management and Pollution Prevention as teaching tool forglobally.

References


IMMERSIVE LEARNING EXPERIENCE ON PORTFOLIO DESIGN THROUGH ONLINE COURSE

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Highlights  
Online course aims unlimited participations and open access via the web. In line with the Fourth Industrial Revolution (4IR), this course represents new ways which involved advanced technologies. Portfolio Design is one of the preparations for students, especially for final year students in preparation for employment. Portfolio Design is very important to gather all the skills and experience for fulfilling market demand. Students are taught how to prepare a portfolio, which is stronger and more professional. With a professional portfolio, it is able to provide an important basis for career development as a successful future designer. This course will guide students in better portfolio improvements, attractive layouts, presentation, and better self-confidence. Practically it coincides with the principle Brain Based Learning theory by Caine and Caine especially emotion is something which is important in designing. Learning is involved and perceptions focus, and minds are livelier and more remembered when facts and practically combined in a lively learning process. This will empower student readiness towards self-learning. Thus, the resulting portfolio can provide an overview of a student’s expertise throughout the course of study. This module is designed to provide guidance in improving the quality of the student portfolio, develop new portfolios, and present their work, and promote themselves alone to potential employers in an attractive way. Learning issues that covered are as follows:  
[1] The organized course will produce a portfolio product at the end of the course, and it acts as a real proof of the skills and abilities the student has.  
[2] This portfolio design course also includes all knowledge, skills, experience and out-of-student activity over a lifetime of students, it can be added both from time to time.  
[3] This course also involves the production of virtual products i.e. e-portfolios which is very much in line with today’s digital era. E-portfolio is divided into several categories of websites, creative videos, interactive apps, e-books, QR codes portfolio and so on.  

The objectives of the project initiatives are as follows:  
[1] Based on established CLO, students can produce portfolio and e-portfolios which is practical and capable of meeting professional requirements. The Portfolio produced can effectively promote skills and work experience in practice of professionalism.  
[2] Provide ease and convince the industry / stakeholders to access talent or human capital resources according to industry requirements specification.  
[3] As an added value to the student and then achieve the goal self-learning can be nurtured through online course.  
[4] Can evaluate the learning process by practicing the three elements learning and teaching namely cognitive, affective, and psychomotor through series effective assessment set out in CLO.

Keywords: Immersive Learning Experience, Portfolio Design, Online Course

Introduction  
This Online course module is designed to provide guidance in improving the quality of student portfolios, developing new portfolios, and presenting their work, and promoting oneself to prospective employers in an engaging way. The issue of learning to be undertaken is as follows: The organized course will produce a portfolio product at the end of the course and it acts as a real proof of the skills and abilities the student has. This Online portfolio design course also includes all the knowledge, skills, experiences and activities outside the student throughout the life of the student, which can be improved over time. This course also involves the production of virtual products, e-portfolios that coincide with today’s digital era. E-portfolio is divided into categories, namely website, creative video, interactive app, e-book, QR code portfolio and so on.

Project Rationale  
Based on established CLO, students can produce portfolio and e-portfolios that are practical and capable of meeting professional requirements. The resulting portfolio can effectively promote skills and work experience in professionalism. Provide ease and convince the industry / stakeholders to access talent or human capital resources in accordance with industry requirements specification. As an added value to students and achieving self-learning goals can be nurtured through portfolio and e-portfolio. Evaluate the learning process by practicing the three elements of learning and teaching namely cognitive, affective, and psychomotor through a series of effective assessments set out in the CLO. Practically it coincides with the principle Brain Based Learning theory by Caine and Caine especially emotion is something which is important in designing. Learning is involved and perceptions focus, and minds are livelier and more remembered when facts and practically combined in a lively learning process. This will empower students’ readiness towards self-learning. Thus the resulting portfolio can be giving an overview of a student’s expertise throughout the course of study (Caine & Caine, 1990).
Background of the innovation

Among the delivery methods practiced for Online portfolio design course are through the implementation of lectures, tutorials and exercises while the methods and types of evaluation are quizzes, assignments, projects and final performances. The technique used is to apply a learning by doing or learning based on action because of the activities and tasks beyond the lecture session. Learning by doing refers to the educational theory described by American philosopher, John Dewey. He stated that learning should be relevant and practical, not just passive and theoretical. During the 14 weeks of this course, lecturers only spend an hour each week to lecture and the remaining 66 hours are devoted to self-study, assessment and learning. Lecturers apply Problem Based Learning by submitting a case or problem during class sessions and students will try to solve them with the help of friends. This allows students to learn through their experience of producing a project.

Importance to education

The systematic and transferable approaches encompassed in this course are practical knowledge, skills, and value of professionalism. Activities involving students to complete each task through interactive learning environments and thus meet industry requirements [Drummond, Nixon, & Wiltshire, 1998]. This course requires students to produce personal resumes, job application letters and design an attractive portfolio to tailor them to the real world of work. The main thing that is often worrying about in completing a resume is lack of experience, they worry that what they have is inadequate. However, the industry is actually researching your resume from many aspects besides the list of experiences, it is a transferable skill. Transferable skills can be used in many industries, it includes communication, problem solving, leadership, group work, adaptability, technical skills and analysis.

All the experiences that students gain during the course have given them valuable skills that make them better. Students can classify these skills as professional and voluntary work experience. The transferable skills acquired by students are mostly scalable based on certain standards. Knowledge gained through Online portfolio design course is effective and able to create more professional students. Today's approach to creative technology education is unlimited. Most learning techniques use PBL (Problem based learning), project studio, or field work. Learning in lecture-based classes, online-based and tutorials alone limits the exploration of new ideas among students. Every student attending creative technology courses should produce an art project that contains the complete design principles. The approach used in this course, such as learning by doing, experiential based learning, and problem-based learning (PBL) is really effective in encouraging students to create new and fresh ideas(Savery, 2006). The dependence of students into lecturers can be reduced when the applied learning gives them the freedom to explore the environment. Through the process of suggesting ideas and producing works based on these ideas, students learn through practical deeds. This is beneficial to students when successfully producing a product or work that meets the design principles that have been set.

Process towards education and student involvement

This course covers all three aspects of immersive learning such as cognitive, psychomotor and effective, as well as students are given complete exposure to meet industry needs. The exposure is not only restricted to the classroom but also involves online mediums that are close to students such as UMK’s e-learning system, “e-campus”, pathbrite as well as special groups on Facebook social media. Information is widely shared among members and can be accessed at anytime anywhere. The learning and evaluation process is also made using this method as it is seen to be very effective in obtaining student engagement. Here are the web application pages used in this course:

https://pathbrite.com/course/PHi6-PMaP024/portfolio-design
https://padlet.com/dashboard
https://kahoot.it/ , and so on

At the cognitive level, students can visualize their knowledge and understanding. Students can also analyse and integrate knowledge and information based on the exploitation of learning opportunities provided. At psychomotor level, students can respond to different situations and develop creative thinking well. In this way, students respond to design requirements, creative ideas and build teams to plan activities effectively. At the affective level, students can visualize active participation, and respond to certain phenomena. For example, to develop a good project or work and coordinate the roles and responsibilities of the team.

Impact on student learning

Based on the sample of the work produced and upload by the student in digital form at pathbrite.com platform, it has proven that the development of portfolio design is a compilation of materials that proves the trust, skills, qualifications, education, training and experience of the student itself. A survey was arranged towards 100
respondents among students to generate data in supporting our research. Respondents are the students from three cohort which taken the Portfolio design course. The results are as follows:

75% respondent use the portfolio they design during the Portfolio Design course in FTKW, UMK.

60% respondents agree that learning through online course for this course are helpful and easy to understand.

70% respondent said that the employer happy with their creative personal portfolios.

Online Portfolio design development also comes in various forms and development to this course featuring more creative and critical portfolio development needs. In addition, this course answers why students need portfolio design development as well as meeting current industry demands. Diversity in terms of the use of software that has been used in the development process of this design portfolio is not only digital, but also students are exposed to creative ideas for producing attractive physical portfolio designs. Through the learning outcomes of the course (CLO) and a series of assessments set by the students achieving an average score of more than 70% of the total scores allocated. Students are deemed to achieve the assigned HPK / CLO. At the end of the course, students demonstrate professionalism in the production of creative work and social communication. Students are more confident in preparing for the real challenge out there. At the end of the student’s learning will present their work in the form of “Mock Interview” that runs simultaneously. Each student is rated by an accredited appraisal panel (acting as an employer). Students must follow all the criteria of actual interviews to ensure they can attract employers, including personal skills, dressing, conversation, manners and so on, besides providing a clean portfolio / resume. The scores given are based on the scoring rubric provided. As a result of this approach the students are found to be more confident and most of them excel in the classroom have been able to get a job before graduating by applying what has been learned.

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References


INTERACTIVE PHYSICAL ACTIVITY EDUCATION PROGRAM (IPAEP)

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Highlights: Interactive Physical Activity Education Program (IPAEP) is a program that has been designed to promote an active lifestyle. IPAEP is aimed to increase knowledge and attitude towards physical activity (PA) among university students. Through this program, students were exposed to various online activities that related to types, risks, benefits and key recommendations of physical activity which is focusing on an active lifestyle. The constructive integration of numerous online applications as a medium for teaching and learning is believed to be able to evoke students’ creativities as well as to provide a flexible and conducive study environment.

Keywords: Online Learning, Physical Activity, Knowledge, Attitude.

Introduction
In current globalization, physical inactivity becomes a central issue for the increase of sedentary lifestyle rather than active lifestyle among young adults which also the roots of many growing health problems both worldwide and in Malaysia. Insufficient physical activity (PA) is on the rise in many countries, adding to the burden of non-communicable diseases and affecting general health worldwide. Physical inactivity has been identified as the fourth leading risk factor for global mortality (6% of deaths globally), after high blood pressure (13%), tobacco use (9%) and high blood glucose (6%). Insufficiently active people have a 20% to 30% increased risk of death compared to sufficiently active people (Institute of Public health (IPH), 2015).

Worldwide in 2014, the World Health Organization reported adults aged 18 years and older who were overweight and obese were 39% and 13%, respectively (World Health Organization (WHO), 2016). Based on previous National Health and Morbidity Surveys (NHMS) carried out in 2006, 2011 and 2015, an increasing trend of overweight and obesity prevalence was observed among Malaysian adults aged 18 years and older: 29.1% and 14.5% in 2006 (IPH, 2006), 29.4% and 15.1% in 2011 (IPH, 2011), 30.0% and 17.7% in 2015 (IPH, 2015), respectively. Changes in individual lifestyle behaviors, such as a lack of PA and increased sedentary behavior associated with rapid urbanization, may lead to an increasing prevalence of overweight and obesity (Chan et al., 2017).

National Health and Morbidity Surveys (2015) indicated that approximately 7.1 million Malaysian adults were physically inactive, which represented 36.9% of the adult population aged 18 years to 59 years old (IPH, 2015). In other words, there were about 4 out of 10 adults who were physically inactive in this country. Residents with only primary school education had the highest prevalence of physical inactivity (38.5%) followed by secondary (37.4%), tertiary (35.4%) and no formal education (34.1%) (IPH, 2015).

Since university students are part of young adults, increasing the prevalence of physical inactivity among this group could not be negligible. A study by Yusoff et al., (2018) on the PA level among 95 undergraduate students showed 66.4% of the students were classified as sedentary PA. A study by Goje et al., (2014) on 202 males and 692 females university students age group 18-25 years revealed the prevalence of physical inactivity among the respondent was 41.4%.

Interactive Physical Activity Education Program (IPAEP) Intervention
Interactive Physical Activity Education Program (IPAEP) was developed based on the Key Massage 3 in the Malaysian Dietary Guidelines (MDG) which is “Be physically active every day” (National Coordinating Committee on Food and Nutrition (NCCFN), 2010). The Key Massage 3 consist of four recommendations which are: 1. Be active every day in as many ways as you can; 2. Accumulate at least 30 minutes of moderate-intensity PA on at least five to six days a week, preferably daily; 3. Participate in activities that increase flexibility, strength, and endurance of the muscles, as frequent as two to three times a week; 4. Limit physical inactivity and sedentary habits. The recommendations are applicable for healthy Malaysians over the age of two years. Very briefly, the students were encouraged to adopt the Malaysian physical activity recommendation (NCCFN, 2010).

The module of the program was delivered through a combination of interactive lecture and online-based learning. The program provided students with current information and guideline to be physically active in daily life. Through this program, students were exposed to various online activities that related to types, risks, benefits and key recommendations of physical activity which is focusing on an active lifestyle. The students were also required to design
a healthy lifestyle program based on Malaysian Physical Activity Pyramid in promoting an active lifestyle. The Model of Interactive Physical Activity Education Program (IPAEP) was shown in Figure 1. The model was aimed to assist both students and lecturers from the beginning of the idea brainstorming session to the final project of the program. Therefore, by applying this model in every learning session enable both students and lecturer to be up-to-date with the changes in the education system. The constructive integration of numerous online applications as a medium for teaching and learning are believed to be able to evoke students’ creativities as well as to provide a flexible and conducive study environment.

The study was used as a quasi-experimental pre-post study design to examine the differential change in pre–posttest of PA knowledge and attitude. One hundred and sixteen (116) students were recruited to participate in 10 weeks of IPAEP intervention. Through this program, all students were received interactive PA lecture by a PA expert and also provided with written materials that contained information on the PA recommendations along with their health-related benefits and examples of moderate to vigorous intensity of PA. The students were also encouraged through social media and website related to increasing physical activities and also received access to a dedicated website with educational materials.

Figure 1: Model of Interactive Physical Activity Education Program (IPAEP)

Results and Discussions

Table 1. Knowledge score for pre and post IPAEP intervention.
Data expressed as Mean±SD and analysed using paired t-test (n=116).

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre-Test Mean±SD</th>
<th>Post-Test Mean±SD</th>
<th>Mean Difference (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of PA score</td>
<td>4.83±1.47</td>
<td>7.46±1.87</td>
<td>-2.63 (-2.85, -2.41)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Attitude of PA score</td>
<td>4.02±0.54</td>
<td>4.15±0.53</td>
<td>-0.134 (-0.26, 0.01)</td>
<td>0.034*</td>
</tr>
</tbody>
</table>

*Difference is significant at the 0.05 level (two tails)

After the IPAEP intervention, the students’ knowledge score was improved significantly from 4.83±1.47 to 7.46±1.87 (p<0.001) whereas the students’ attitude score was also increased significantly from 4.02±0.54 to 4.15±0.53 (p = 0.034) (Table 1). The total mean difference before and after intervention was 2.85 and 0.26 for attitude and knowledge score respectively. It is implying that IPAEP is effective in improving the PA knowledge and attitude of students. Previous studies have reported online-based PA education showed positive relationship towards to encourage healthy behaviors (Cavallo et al., 2012; Okazaki et al., 2014). Study by Ghaffari et al., (2013) indicated that educational intervention of PA was effectiveness in increasing PA knowledge and improving PA attitude of students. Furthermore, study by Parrott et al., (2008) on Implications for an email-based PA intervention among sedentary college students
revealed that intervention group reported the level of exercise attitude were higher compared to control group. Study by Tabatabaei et al., (2012) on the effect of education in physical activities also revealed that after educational intervention, there was a significant increase in the mean knowledge and attitude score.

**Conclusion**

The IPAEP has successfully triggered the students’ interest to have active lifestyle. Since the IPAEP is emphasized in educating university students on importance and recommendation of PA as well as impact of physical inactivity, the program is very useful to encourage university students to be physically active every day. Furthermore, the current study could contribute to the better knowledge and attitude towards physical activities which eventually beneficial for their active lifestyle in future.

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BLENDS OF AUGMENTED REALITY AND INFOGRAPHIC IN LABORATORY PRACTICAL EXPERIENCE

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Highlights: The classical way of conducting a practical session by distributing a manual with a lengthy description of the procedures often lead to disengagement of the students on following the correct protocol in performing a specific laboratory test. Visual learning is more effective and holds more appeal than plain text. The blend of augmented reality and infographic is expected to become a motivational method in enhancing students’ attention in going through the manual. The result of this study indicated that the majority of the students had positive perceptions of the use of AR-embedded infographic.

Keywords: Augmented reality; Infographic; Laboratory; Practical class; Visual learning

With most of the fact-based knowledge being discovered long ago, as a never-changing fundamental resource for our education; the advancement in the education system now lies within on the outreach to more peoples who are in the field of interest and on the effectiveness the knowledge is being delivered and grasped easily. Today, we live in the 21st century, and technology has become an integral part of our everyday lives. Assimilation of the technology in the education system can no longer be denied and thus making use of it is thought to benefit both educators and learners. Education with traditional methods as we know is becoming a thing of past. Such that the classical way of conducting a practical session by distributing a handout or manual with lengthy description on the standard operating procedure often lead to disengagement of the students on following the correct protocol in performing a laboratory test. It is thus important to be able to grab the attention of students through the help of modern technologies.

Augmented reality (AR) in education is taking a leading position in the education technology industry. It provides an enriched view on a plane subject and adding layers with contextually useful information. As people prefer to break down information and data that would otherwise have been difficult to digest, infographics serve as a great tool to allow people to easily digest information through the use of visual data, charts, and statistics. With the proper use of color, proportion, and negative space, information can be transformed into memorable, attention-grabbing and even persuasive graphics. It is therefore effective than text-based content because of highly shareable in which it is accessible to almost everyone and not only a strong reader. The blend of AR and infographic is expected to become a motivational method in enhancing students’ attention in going through the manual of a specific laboratory test. And collectively stimulated multi-senses through the practical session to allow greater learning takes place.

To accomplish the aim of this study, infographic of a related laboratory test from one of the practical session was prepared. This infographic was then embedded with AR on the most prominent section to allow the users to scan and receive a video of that particular laboratory test procedure on their smartphone. Candidates were then required to go through the AR-embedded infographic and traditional manual and the closed-ended questionnaire was used to collect the required data. The targeted population for this study was the students (45) of DVM 2 from the Faculty of Veterinary Medicine, Universiti Malaysia Kelantan.

In this research, the primary data was used for gathering information. The result showed that there were 78% of students think that AR-embedded infographic attracts their attention better than the traditional manual. Seventy-six percent of them agreed that AR-embedded Infographic handout is interesting and 67% of them think it is easier to be understood. However, only 58% and 60% of the students prefer to have AR-embedded infographic to substitute traditional manual handout for their practical class and even incorporated into a lecture. And the reasons given on this low agreement are mainly due to lack of support on either software and hardware viz. limited internet access and restricted system (only android) can be used and plenty of technical issues due to the early development. One point that encouraged to continue with this method is whereby most of the students (75%) think that AR-embedded infographic is helpful in self-pace learning. Overall, the analysis of the data indicated that the majority of the students had positive perceptions of the use of AR-embedded infographic as a manual for practical class.
People learn more when content drives the choice of modality, it is believed that one can learn more effectively if they use their preferred style more often. This AR-embedded Infographic is not restricted for campus or institutional use. We believe that promotion on community campaign for instance on public health and environmental issues can also be addressed more effectively through the use of AR-embedded Infographic poster. Practical manual (book) with compilation on AR-embedded Infographic of all topics can be produced and marketed. Besides, AR-embedded Infographic poster can also be designed and distributed to authorities such as hospital, museum, zoo, etc. for public education. This project is to support the National Policy on Industry 4.0 for the digital transformation of the education sector in Malaysia. Also, to provide quality education with AR technology to all the students (United Nations Development Programme).

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References
THE AUGMENTED REALITY DESIGN OF CARDIOVASCULAR SYSTEM- ARCORE BASED TECHNOLOGY (CSAR) FOR UNDERGRADUATE PHYSIOTHERAPY PROGRAM IN UNIKL, RCMP

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, Universiti Kuala Lumpur, RCMP, Ipoh Perak, Universiti Kuala Lumpur, RCMP, Ipoh Perak

Highlights: Anatomy and physiology are one of the important subjects, which formally taught to the physiotherapy students. The main educational objective is to provide knowledge on human anatomy structure and system, which is important to determine physiotherapeutic treatment and skills. In UniKL, RCMP’s Physiotherapy Program, anatomy, and physiology learning activities involve with lecture-based teaching, using artificial bones and performing clinical tests on human cadavers. The traditional anatomy and physiology learning method were taught by didactic lectures, while the use of cadavers is limited due to the issues such as storing, morality, public perception as well as the reduction in a cadaveric donation. Therefore, more advanced in learning method is needed to overcome this gap and enhance the students’ learning. The main focus of this study is on highlighting the crucial design characteristic to develop an augmented reality application in anatomy and physiology course. The used of ARCore technology give an advance to the technology with a better experience of augmented reality to the user rather than using the maker less or maker-based technology. The study conducts a user study to evaluate the usability and learnability effectiveness of the application. A total of 80 participants will be involved in this study, which are undergraduate students in the diploma of physiotherapy program at UniKL, RCMP. Therefore, this study will contribute knowledge in design and development of the augmented reality environment. Hence, this study will be a step forward to an exploration of the AR benefit inexperienced- learning approach application.

Keywords: augmented reality, physiotherapy education, cardiovascular system, multimedia interactive development

Introduction
Anatomy and physiology are one of the important courses, which formally taught to the physiotherapy students. Generally, this subject help student to identify the specific structures of bones, muscles, tendon, ligament, joint and other soft tissues [Youdas, Krause, & Hellyer, 2015]. The main educational objective of this course is to provide knowledge on human anatomy structure and system, which is important to determine physiotherapeutic treatment and skills. In Universiti Kuala Lumpur, Royal College of Medical Perak’s (RCMP) Diploma in Physiotherapy Program, anatomy and physiology learning activities involve with lecture-based teaching, using artificial bones and performing clinical tests on human cadavers. The traditional anatomy and physiology learning method which based on 2D images and plastic model materials were taught by didactic lectures, while the use of cadavers is limited due to the issues such as storing, morality, public perception as well as reduction in cadaveric donation [Chien, Chen, & Jeng, 2010; Thidar, Myint, Khin, & Naing, 2016]. Even though the use of cadaver dissection allowed students to view the human anatomy structure, however, students may experience the feeling of stress and anxiety because the patient is a dead one [Thidar et al., 2016], meanwhile, the physiology could not be observed on the dead organ. Therefore, more advanced in learning method is needed to overcome this gap and enhance the students’ learning.

Learning anatomy and physiology requires students to relate the human anatomy structure, their physical attributes and its relationships to one another. Small structures can only be observed and analyzed with the use of a microscope and other larger structures do not need the aid of magnification, readily be seen. Meanwhile, the study of their physical attributes and its relationships to one another can only be done through a dissection. The emerging technology such as augmented reality which used three-dimension (3D) has given a better view for anatomical education. The use of augmented reality (AR) with the help of ARCore technology allowed a better experience for learning in merging the augmented reality and real-world environment. Hence, with an improved understanding of the real-world environment, ARCore can make any horizontal or vertical surfaces in real-world that act as a plane to anchor the 3D objects.

The AR has continued to improve the learning experience by providing teaching aids which offer a closer likeness to the human body which relates to its structures and functions [Falath et al., 2015]. The use of AR in education can improve teaching and learning in many ways. One of the most significantly enables students to obtain knowledge and a better understanding of the human body within a virtual environment, which allows the user to manipulate action such as modify objects size in the virtual environment, which is the most important point for the student as this
is impossible to accomplish in reality. Therefore, this study aims to develop 3D visualization specifically focus on the cardiovascular system for undergraduate physiotherapy program at UniKL, RCMP. The main focus of this study is on highlighting the crucial design characteristic to develop an augmented reality application in anatomy and physiology course. The study hypothesizes that 3D visualization of human anatomy structure in the AR with the use of ARCore technology can enhance the learning process. Hence, this study will contribute to the overall understanding of the design perspective in AR development. The objectives for this research are to design and develop cardiovascular system augmented reality application using the critical design characteristics for undergraduate physiotherapy students.

System Design

This study aims to design the AR application for an immersive 3D visualization, which allows students to understand the cardiovascular system with audiovisual support. A complete structure cardiovascular system model will be reconstructed in 3D visualization which can be decomposed and reassembled. The AR design will provide detail information to the students, which includes the heart’s position, layers, chambers, and valves. The AR system is designed with clear labeling and interactive 3D model for user to easily get the related position of upper and lower limb model in a different angle. Based on the perspective of the cognitive learning theory, the proper design of the multimedia courseware used the multimedia design guidelines by Clark and Mayer (2011) works. The proposed model aims to further develop the cognitive theory of multimedia learning based on Clark and Mayer’s (2011) work. Seven principles were used throughout the multimedia design presentation:

Table 1.1: Multimedia design guideline (Clark and Mayer, 2011)

<table>
<thead>
<tr>
<th>Principles</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Multimedia and Modality Principle: To communicate content, use the relevant graphics explained by audio narration</td>
</tr>
<tr>
<td>2)</td>
<td>Exception to Modality Principle: For information that needs learner’s time to process use text on the screen</td>
</tr>
<tr>
<td>3)</td>
<td>Temporal Contiguity Principle: Do not separate visual and audio that describes the visual</td>
</tr>
<tr>
<td>4)</td>
<td>Redundancy Principle: When using graphics on the screen do not present words as both onscreen text and narration</td>
</tr>
<tr>
<td>5)</td>
<td>Coherence Principle: Avoid irrelevant videos, animations, music, stories, and lengthy narrations</td>
</tr>
<tr>
<td>6)</td>
<td>Personalization Principle: Use conversational style using the first and second person for audio scripting</td>
</tr>
<tr>
<td>7)</td>
<td>Segmentation Principle: Break content down into small chunks using continue or next button</td>
</tr>
</tbody>
</table>

The design interface will provide an extra window to show detail information of each the heart structure. Thus, the student can get immediate information without the need to check textbook or other resources to get the detail information which means student do not get distracted while viewing the anatomy structure. The AR anatomy learning application in this study is used as supplementary materials to help physiotherapy students to obtain knowledge and better understanding in the anatomy course. In this study, users will need an android smartphone in order to simulate the immersive 3D visualization of the cardiovascular system.

Creative Design Production

This section explains activities involved in the creative design production in designing the prototype. Based on the systematic search strategy from the literature review, this study has used the following design characteristic for the design and development of CSAR content application:

Table 1.2: Design characteristic for CSAR application

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface design</td>
<td>Information presentation: Effective learning through the presentation of 3D organ which provide actual object position in human body together with explanation (Layona et al., 2018).</td>
</tr>
<tr>
<td></td>
<td>Provide information about organ system and its function (Nuanmeesri, 2018).</td>
</tr>
<tr>
<td></td>
<td>Use a realistic images and smooth object transition between one object to another within a 3D view angle (Salmi et al., 2015).</td>
</tr>
<tr>
<td></td>
<td>Provide 3D digital model to represent the real human anatomy (Ferrer-Torregrosa et al., 2015).</td>
</tr>
</tbody>
</table>
**System Input and Selection & Control of the System:**
Use accurate trackable image for object interaction and enable user to choose from menu selection. (Layona et al., 2018).
Allow user to modify virtual structure position to offer different perspective of the subject matter (Ferrer-Torregrosa et al., 2015; Juanes et al., 2014)
Non-linear navigation to offer free navigation within the application (Salmi et al., 2015).

**Text Overlay**
Standard ergonomic requirements:
Provide labels with relevant information to assist greater understanding and retains memory.
Provide description panel to which consist of more information about the subject (Salmi et al., 2015).

**Audio Content and Speech Recognition**
Content relevance & system control:
Use of instructive audio as complement to support 3D digital model (Juanes et al., 2014).

Meanwhile, the following figure illustrate the method used for the AR content in this study. Firstly, a real object of heart anatomy will be scan using MRI for reconstructing 3D modeling. To create a realistic of human heart anatomy, texturing process were done. Next animation is create for the 3D model. The 3Ds max software is used for 3D modelling development, creating the texturing, and animation process. The cleanup of 3D model then was import into Unity software using fbx format. Two types of adjustment will be done on the 3D model and layout. The programming language of C# scripting is used for navigation and user interaction, while debugging process is performed to identify issues and problem in the Unity development.

![Figure 1.1: AR creation method for CSAR application adapted from (Camba & Contero, 2015)](image)

Figure 3 describes the AR process which start with the identifying real object of the cardiovascular organ, which then is scanned to retrieve the MRI image. Based on the MRI 3D modelling was constructed, later texturing is applied to create a realistic model of cardiovascular for the CSAR application.

![Figure 1.2: AR creation process (a) real object, (b) MRI image, (c) 3D model, (d) texturing, (e) augmented reality](image)

**Cardiovascular System-ARcore (CSAR) Based Technology**

The following figures illustrates the interface design of CSAR, based on the crucial design characteristic from the previous study:

DeTAR Putra, Universiti Malaysia Sarawak
Conclusion
The present work aims to explore the advantages of AR as an educational tool in anatomy structure for physiotherapy education. The research aims to design AR based application from the view of instructional designer, hence it will define a proper experimental set-up for the design issues and testing to enhance anatomy structure learning by immersing students in a virtual environment. Therefore, this study will contribute knowledge in design and development of augmented reality environment. Hence, this study will be a step forwards to an exploration of the AR benefit in experienced-learning approach application.

References


AR - MY ENDANGERED SPECIES

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Highlights: Innovation is inspired to sustain its impact on the community all over the world. The creation of this E-Learning tool, AR – My Endangered Species is inspired to bring the endangered species to all the children and learners of the Malaysian classrooms. This is to arrest the problem of students of underprivileged vicinity in Malaysia that were not informed of this knowledge of endangered species such as the renowned animal of Malaysia, the turtle. Thus, here is where augmented reality comes in play, the bringing of endangered turtle and other species into the classroom for students to learn. With this augmented reality, the students can experience virtual learning and take steps to protect the turtle from harm by environment and man. Specifically, the students will be able to learn and relearn to preserve the natural wildlife.

Keywords: Augmented Reality, Interactive, Endangered, Educational, E-learning, Knowledge, Introduction

AR - My Endangered Species is created to bring the beauty of this nature of endangered species to the classroom by not using complicated AR software, that may cause a whole new way of installing it. This tool of learning will use the well-established Facebook Platform that we can run the AR on. Herewith, this platform can have a high roll out any limitation of having a cross-platform issue, that is to solve the problem of inability to provide AR to all. On top of that, by using the Facebook Platform as a delivery mechanism, it is much easier to introduce and encourage learners to start using AR efficiently.

Firstly, endangered Species is one area we need to act on to preserve and start making changes as soon as possible, due to the proximity of the species running towards extinction daily, for instance the Sumatran rhino which is already being declared officially extinct as there is no sighting of this animal for more than 5 years and with the last male being death recently, (Battel.J, 2019) Next, if action is not taken, we will be losing our Turtles which are very significant and precious and symbolizes our country Malaysia. The soon to become extinct are the green (Chelonia mydas), hawksbill (Eretmochelys imbricata), olive ridley (Lepidochelys olivacea), and leatherback (Dermochelys coriacea) turtles. Furthermore, our Malayan Tiger is also really at the brink of extinction. With the death of more Malayan Tiger throughout this 2019 Festive Raya break, this clearly reinstates that the future generation should make a change. However, the problem is no change can be made, if learners at a young age were not taught to love and preserve endangered species. Many learners of this age do not even know about turtle or rhino or tiger.

Therefore, by using tools like Augmented Reality the only medium we need to get this species into the classroom, this can be accessible simply by using only a smartphone, Android or IOS, and a stable internet connection. Imagine the impact we can make in teaching future generation the importance of world animal preservation and the awareness that AR – My Endangered Species can make a difference with such small inspired innovation.

Description of this innovation
By using Augmented Reality, we are bringing Endangered Species into the classroom by just using smart mobile devices, learners of all ages will be able to experience The Animal anywhere internet is available.

The context or background of AR - My Endangered Species
The innovation is inspired by using Augmented Reality to bridge the gap from learning that is confined to the 4 walls of the classroom. The Facebook platform is the backbone of the Augmented Reality and we can always add new content to it which makes it compatible across any platform. Thus, with AR tools like SPARK AR all contents will be protected under Creative Common Copyright.

The importance of AR - My Endangered Species towards education
We can educate students in the classroom with real life experiences as students are able to learn better when they experience knowledge first hand. In addition, significantly, they will be able to find a solution for the Endangered Species which is a sustainable effort towards the future generation. Advantages of our innovation towards education and community. Find a solution towards preservation of endangered species. Working towards United Nation, Sustainable Development Goal. Educating learners through experiential learning via AR Changing the mindset of School Community towards endangered species.
Added commercial value
Free marketability for every student with only a Smartphone
Long lasting and a cost-efficient method of introducing AR to learners.

Acknowledgement
We are grateful to Universiti Putra Malaysia, for providing us the opportunity to explore the possibility with AR

References
Alkhattabi, M. (2017). Augmented Reality as E-learning Tool in Primary Schools’ Education: Barriers to Teachers’ Adoption. International Journal of Emerging Technologies in Learning (IJET), 12(02), pp. 91-100. doi:http://dx.doi.org/10.3991/ijet.v12i02.6158
PC ASSEMBLER APPS: A STEP BY STEP GUIDE IN ASSEMBLE YOUR OWN PC USING AUGMENTED REALITY TECHNOLOGY IN LEARNING COMPUTER ARCHITECTURE AND ORGANIZATION (CAO).

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Highlights: This research work introduce “PC Assembler Apps”. It’s a step by step PC assembly guide on mobile application that is integrated with AR technology. In this research work, we also study the quality of user experience by employing and adapting “Mobile Apps Rating Scale” in using the “PC Assembler Apps”.

Keywords: AR, tutorial, interactive learning, computer architecture and organization

Introduction
Augmented Reality (AR) technology has been rising steadily nowadays. In the context of learning in the 21st century, “PC Assembler Apps” is practically used in classrooms as a tool for teaching and learning purpose. Students at Sultan Idris Education University (UPSI) who take Computer Architecture and Organization (CAO), is required to attend a lab session to fulfill the subject requirement. This lab session is mainly to train them to learn PC assembling, operating systems installation, and PC troubleshooting. Currently, the students only rely on manual assembling component and installations reference. Based on our preliminary survey, we found only 20 percent of students refer to the printed manual. Additionally, we also found that the majority of the students experienced computer anxiety problems during the lab session. In this research work, we introduced the “PC Assembler Apps” application that is integrated with AR technology. We employ and adapting “Mobile Apps Rating Scale” to study the quality of user experience in using “PC Assembler Apps”. The results demonstrate a positive response in three particular categories; i) Content; ii) Interface/Aesthetic Value/Functionality and; iii) Student Engagement. Towards commercialization, “PC Assembler Apps” are expected has a wide potential to be market in Google Play store for android device and Apple Store for iOS device. We also anticipate “PC Assembler Apps” to be used at various level of education institutions, which includes schools, community colleges, polytechnics, and university. In conclusion, by incorporating AR technology provides better teaching and learning (T&L) experience.

Benefits
Self-paced learning helps students able to control their own study time in learning a subject matter.
Interactivity between PC components and video tutorial enhances student engagement in learning CAO.

Novelty
AR technology is integrated into the apps to promote active learning in a classroom.
Interactive video tutorial helps in engaging students to assemble PC components from scratch.

Commercialization
To be market in Google Play store for android device and Apple Store for iOS device.
As a teaching and learning (T&L) tool at higher institution for subject Computer Organisation and Architecture or even at primary and secondary school level.
Figure 1: PC Assembler Main Interface

References


DeTAR Putra, Universiti Malaysia Sarawak
INARCH-APPS: INTERACTIVE GAME BOARD USING AUGMENTED REALITY (AR) TECHNOLOGY IN SUPPORTING LEARNING ABOUT PERSONAL COMPUTER (PC) COMPONENT

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Highlights: This study has introduced iNARCH-Apps applications that apply the learning by playing approach. Students learn to recognize the appearance of the personal computer (PC) and component in 3D visualization through GBL approach using the game board and mobile phone that integrated with AR technology. Students will be tested on PC component with questions to be answered. Indirectly, students can identify and remember the name of the PC component by playing methods. This research has also seen students learning experience using developed applications.

Keywords: Augmented reality, computer organization and architecture, game-based learning, mobile application, teaching tools.

Introduction
Education has always been a hot topic among intellectuals and reformers. The growth of technology has seen its roots grow into education. Augmented Reality (AR) is one of the important technology that will impact education in the future. So, the AR will introduce new and additional ways in education that able to make learning more engaging and information more apprehend able. The learning must come with the creative and interactive element to attract interest in learning such as Game-Based Learning (GBL). This study aimed to give first 3D visualization of PC component to students using GBL approach which the learner can explore the relevant aspect of games in a learning context. This research is focusing on developing the GBL mobile application for Computer Architecture and Organizations course in Universiti Pendidikan Sultan Idris (UPSI) namely iNARCH-Apps. This development of iNARCH-Apps is to diversify the teaching tools to assist the student in the learning process, which enriches the scientific materials for student use and to enhance the knowledge of student using the latest technology. The researcher used an ADDIE Model and Kemp’s Model for the development of iNARCH-Apps. ADDIE Model was the main model used for mobile application development. While Kemp’s Model used as a part in this research of educational games for supporting the main model. The result of finding show that 78.3% of respondents agree with using AR mobile application can help students’ learning and make the learning skill more interesting. iNARCH-Apps has the potential for commercialization used as teaching and learning tools for subject Computer Architecture and Organizations in educational institutions such as primary and secondary schools, community colleges, vocational colleges, polytechnic colleges, and universities. As a conclusion iNARCH-Apps demonstrates that AR technology can enhance meaningful learning and make a powerful connection of reality with digital content that has a positive impact on education in Computer Architecture and Organizations.

Benefits
Better Learning Experience
Learning is fun with creative engagement between student and learning material. A good gamification strategy with high levels of engagement will lead to increase in recall and retention.

Behavioural Change
iNARCH-Apps can drive strong behavioural change to especially when combine with scientific principal of repeated retrieval and space repetition.

Novelty
I. AR and Game board technologies are integrated into the app to promote active learning in the classroom.
II. Pictures in 3D can help students to recognize the hardware of a computer without having to look in the real way or touch the equipment physically in the classroom.
III. Students can learn while playing not only in the classroom but also in the field.
Commercialization

As a teaching and learning tool in education institution for Computer Architecture and Organizations subject. Improving students’ knowledge and skills in Computer Architecture and Organizations. Also available in iOS platform and have many versions based on student’s education level such as the difficulties of the questions in future work.

![INARCH-APP](Image)

Figure 1: INARCH-APP

References


Mario M. Z., Francisco J.D.P., Leire B.M, David G.O & Miriam Antón Rodríguez, Mobile Serious Game using Augmented Reality for Supporting Children’s learning about Animals, Procedia Computer Science 25 (2013) 375 – 381.
CHC APPS: INTERACTIVE TEACHING AND LEARNING TOOL FOR LEARNING COMPUTER HARDWARE COMPONENT USING AUGMENTED REALITY TECHNOLOGY

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Highlights: This research work presents Augmented Reality based prototype for “Computer Hardware Component Apps”, known as CHC Apps. CHC Apps can be utilized when students have difficulty to remember the name of computer hardware component and its functions, besides this generation prefer more usage of interactive mobile application. In this research work, we study the usability of CHC Apps which based on Technology Acceptance Model (TAM). Surveys and questionnaires are used to evaluate CHC Apps prototype and the output act as input to modify the second version of CHC Apps in future. The overall findings showed positive assessment towards effectiveness, efficiency, and the satisfaction of the prototype application.

Keywords: Augmented Reality (AR), usability assessment, interactive learning, Computer Hardware Component (CHC).

Introduction
Augmented Reality (AR) is a technology that blurs the line between what’s real and what is computer-generated by enhancing what we see, smell, hear and feel. There are many applications of AR has been developed, in various fields, including education. Educators know that the learning process should be all about creativity and interaction. While teachers do not necessarily need to recruit all students into science, their goal is to get them interested in the subject. That’s where AR could come in handy. In this project, Computer Hardware Component Apps, known as CHC Apps, is the mobile application AR-based prototype developed to assist students on studying Computer Hardware Component, specifically in identifying every component in the system unit and its main function. We tested the prototype towards 50 respondents which are Sultan Idris Education University (UPSI) students. The usability assessment was divided into three parts, which are the Graphic User Interface (GUI), Functionality, and Usability of CHC Apps. The findings of the assessment show positive feedback of the effectiveness, efficiency, and the satisfaction of the application. This can bring positive impact for commercialization in the Google Play store and Apigate Go platform. With the gamification section embedded, it will give active participation and enjoyment to all level of learners, including schools, community colleges, polytechnics, and university.

Benefits
Development of self-pace learning tool that may help students to control their own study time in learning a subject matter.
The usability assessment gives preliminary review of target users’ acceptance towards AR-based apps, with suggestions towards enhancement for the second version and before the real version released.

Novelty
AR technology is integrated into the apps to create interactive teaching and learning material for promoting active learning in a classroom.
The usability assessment can be utilized as basic guidance towards promoting AR-based apps for education.

Commercialization
For this Android prototype, CHC Apps is marketable in Google Play store and Apigate Go platform. Since the content is based on curricular of Computer Hardware Component, and the usability assessment manage to get positive feedback of the students (respondents), it can be utilized as teaching and learning (T&L) tool at higher institution for subject Computer Organization and Architecture or even at primary and secondary school level.
Figure 1: CHC Apps Module and CHC Apps Main Interface

References
GAMIFICATION APPROACH IN TEACHING PRECISION AGRICULTURE

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Highlights: This study analysed the effectiveness of gamification in teaching Bachelor of Bioindustrial students in Universiti Putra Malaysia Bintulu Campus in the subject of Precision Agriculture. An online survey form was filled by the student after the gamification task. The results showed that students enjoy gamification as part of their learning process. However, gamification might disrupt the stigma of typical traditional learning process. The study concludes that gamification can be a part of the learning process in Precision Agriculture subject.

Keywords: Gamification, Precision Agriculture, Treasure Hunt,

Introduction
Agriculture sectors in Malaysia play a crucial part in food security. Our demand for food increases every year due to population increment. In recent years, the use of technology in agriculture have become a trend as the demand for agricultural products increases. One such technology is Precision Agriculture, a technology where farmers can generate better agricultural production and leverage their income. However, the application of this technology is still underutilised.

Thus, in the university level, Precision Agriculture was introduced and incorporated in the programme syllabus to cope with current agricultural demands and knowledge. Students nowadays are immersed in technological marvels such as smartphones and applications. Therefore, the integration of technology and outdoor gamification education can be a tool of self-centred learning instead of traditional formal learning. Hence, the integration of gamification education in Precision Agriculture plays a role in nurturing the students’ interest and enhance their cognitive, psychomotor and affective aspects. This could lead to higher enthusiasm and learning capabilities of the students for the subject of Precision Agriculture.

Content
The study was conducted in University Putra Malaysia Bintulu Sarawak Campus. The participants for the gamification module were Bachelor of Bioindustrial Semester 4 students. The objective of the gamification is to enhance student’s active learning skill and promotes interest, motivation and learning on agricultural subjects.

In this study, 55 students taking Precision Agriculture (CAT4100) were split into two groups and each group will have a chance to develop and conduct Precision Agriculture Treasure Hunt. The students were required to learn and use GPS units and georeferenced data classified according to clues to find the finish line. Students learned to perform basic skills using a Garmin GPS unit; mark waypoints, navigate to a waypoint, using the compass and ‘go to’ functions to estimate distance to a pre-programmed point. Students worked in teams in helping each other whilst doing revision for this subject. The task for the games were mostly based on Precision Agriculture and other subjects in their programme’s syllabus.

The students needed to choose six to eight identification stops (depending on the number of students in the groups assigned) with appropriate location on the campus. Students then marked the identification stops and their coordinates on a campus map. The clue for each stations were based on the information from Precision Agriculture or other subjects lecture notes. In the end, the students were able to produce a treasure hunt map. The lecturer roles were to advise the students about their pit stops as well as the type of tasks and questions assigned in the Precision Agriculture treasure hunt. This was to ensure that the students’ works was within the scope to achieve the subject’s learning objectives.

This gamification module taught students about spatial thinking, and relating the location of objects to photos, team building and cooperative skills to solve problems and most importantly understanding Precision Agriculture.

As said by Dicheva, Dichev, Agre, & Angelova (2015), the model for introduction of gamification into the field of e-learning includes organizing, planning, staffing, leading and controlling all important elements of e-learning. In this case, the students also learnt these elements as mentioned above.
**Results and Discussion**

Table 1.0 shows the response of gamification approach for Precision Agriculture (CAT4100). From the table, 45.5% of students strongly agree that gamification approach improved their learning skills. This is because gamified learning experience suggests a deeper engagement (Barata, Gama, Jorge, & Gonçalves, 2013). It leads to 60% of the students in feeling interested in learning this subject out of the total students. Chevtchenko (2013) posits, games should be designed to tap a broad spectrum of emotions in order to consistently provide fun as a motivator that will also enable them to trigger different kinds of motivation. Thus, it also improved their active learning which is at 41.8%.

As said by (Muntean, 2002) Motivation are caused by couples of opposites factors like pleasure/pain, hope/fear, and social acceptance/rejection. Thus, gamification motivated 49.1% of the student and motivate them to learn in groups and gain the ability to solve the task. As said by Chevtchenko (2013), conceptual elements of the game, such as constraints, relationships, narrative, and progression create a dynamic for the students to play the treasure hunt.

Table 1.0 : Students response on gamification approach for Precision Agriculture (CAT4100)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better Learning</td>
<td></td>
<td>0%</td>
<td>0%</td>
<td>9.1%</td>
<td>45.5%</td>
<td>45.5%</td>
</tr>
<tr>
<td>Interest in learning</td>
<td>in</td>
<td>0%</td>
<td>0%</td>
<td>9.1%</td>
<td>30.9%</td>
<td>60%</td>
</tr>
<tr>
<td>Active learning</td>
<td></td>
<td>0%</td>
<td>0%</td>
<td>12.7%</td>
<td>15.5%</td>
<td>41.8%</td>
</tr>
<tr>
<td>Motivation of learning</td>
<td>1.8%</td>
<td>3.6%</td>
<td>16.4%</td>
<td>29.1%</td>
<td>49.1%</td>
<td></td>
</tr>
</tbody>
</table>

*Note. 1= Strongly Disagree 2=Disagree 3=Neutral 4= Agree 5=Strongly Agree

Figure 1.0 shows student’s response on the effectiveness of gamification approach for Precision Agriculture (CAT4100). 50.9% of the students strongly agreed that gamification approach is effective. Therefore, it is highly suggested that this approach should be incorporated in their syllabus. As suggested by Dichev et al.(2015), the development of software tools should support gamification in various educational contexts and encourage more adoption efficacy of gamification in education.

Figure 1.0: Students response on the effectiveness of gamification approach for Precision Agriculture (CAT4100)

**Conclusion**

The study suggests that gamification for Precision Agriculture subject had encourage student motivation and lead to better participation and performance as it provide a fun learning experience. As posit by (Urh, Vukovic, Jereb, & Pintar, 2015), gamification can increase satisfaction, engagement, effectiveness and efficiency of students in their learning process.

**References**


BIG DATA ANALYTICS ON E-LEARNING PLATFORM: AN ENHANCEMENT TO STUDENT ENGAGEMENT

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Highlights: Big data analytics on e-learning holds the potential to transform the way we learn, work, and teach; and to achieve its full potential, it must be clearly defined and embedded into the institutional learning and teaching activities, processes, practices, policies and student engagement strategies. This paper explains both the application of big data e-learning analytics and its implementation in improving student engagement. The method of data collection is through an analytics API (Google Analytics) embedded via the Universiti Malaysia Perlis’s (UniMAP) e-learning platform using Moodle (a knowledge management system). The data collected includes changes in the behaviour flow of student engagement (drop rate), device category of user’s session (mobile, desktop or tablet), duration of engagement, operating system of choice, bounce rate per pages and demographic of user. Analysis of the data collected shows trends that reflects previous research that validates the improvement in student engagement with technology implementation (Salleh, Siti Amiza & Zuhaily, 2018). Therefore, following this analytic trends, Facebook Messenger was introducing to the system (Moodle) as a form of enhancement to teaching delivery methods. The Facebook Messenger introduced will not be used only as a simple chatting tool but also as a part of an artificial intelligence feature that works as a centralize knowledge (or engagement) management tool (such as for attendance (admin), quizzes, polls, asynchronous interaction, big data analytics and knowledge management system).
INTERACTIVE AUGMENTED REALITY (AR)-BASED LEARNING CARDS FOR LUN BAWANG LANGUAGE

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Highlights: The learning of Lun Bawang among the younger generation is deteriorating due to the lack of learning materials that spur their interest. In this project, a set of interactive augmented reality (AR)-based learning cards was produced. Each card contains interactive elements of Lun Bawang words for young learners to learn.

Keywords: augmented reality, learning cards, Lun Bawang

Introduction

Lun Bawang is one of the minority language in Sarawak and is slowly fading if there is not action to be taken to save this language. Studies shown that Sarawak indigenous languages are “losing their hold in daily communication” due to widely use of other dominant languages in the society (Ting & Ling, 2012, p. 5; Smith & Smith, 2017). The need to preserve and revitalize this language is crucial as it is part of culture because according to Tengku Sepora Tengku Mahadi and Sepideh Moghaddas Jafari (2012) stated that “words are the most significant tools of cultural symbols” (p. 232). For that reason, one must hear or read about the Lun Bawang’s stories, myths or songs to have further understanding of their culture, as the way they use the language can express their thought or way of thinking. Furthermore, proper documentation of a language must be taken into account. This is to help the younger generation to be able to learn the language easily. In Hemmings (2018) studies, she found out that the problem in teaching Lun Bawang is the lack of proper documentation of the language making it difficult to be systematically taught as subject. Hemmings (2018) also noted that phonological and lexical differences are also the problem in learning the language that often cause confusions. Due to lack of resources of the Lun Bawang language the bible ‘Bala Luk Do’ which dialect of Long Semado is use as references and the older generation for sound description. Fortunately, the indigenous communities have embraced technologies such as audio, video and multimedia as a means to revitalize their language.

Although the study on the use of technology in preserving indigenous languages have been conducted, the use of AR for such purpose remains an area worth investigating. In the case of Lun Bawang, this technology is hoped to be able to lure the younger generations to value the language more and master it from young. Limited studies have been done in this aspect of revitalizing the use of Lun Bawang by using technological tools. Therefore, the purpose of this study is to find out the usefulness of using AR-based learning materials in encouraging young learners to learn Lun Bawang.

Development of Innovation

The design of this study involved three (3) main stages in relation to the Design Thinking processes. The three (3) main stages are pre-development (Empathize and Define), development (Ideate and Prototype) and Evaluation (Test). In the pre-development stage, the learners must be involved in the beginning. For the first stage, empathize stage, the learners are asking to provide feedback of problems in learning Lun Bawang through interview. Then, the problem of difficulty in learning their own ethnic language that was identified in Empathize stage was narrow down in Define stage. Hence, problems in learning Lun Bawang must be identified before moving on to the next stage.

Next, in the development stage of Ideate stage, all ideas, ways or solution are constructed in solving the identified problems of learning Lun Bawang that was obtained in the previous stage. Later, a suitable prototype was developed in learning Lun Bawang. Lastly, evaluation on AR application was tested out by the learners to perceive the usefulness of the AR-based learning materials.
Description of Innovation

In order to use the card, learners will have to download the Zappar app from Play Store or AppStore and flash it over the learning card. The interactive elements will then pop up and the learner would be able to interact with the buttons provided as shown in Figure 1. The AR-based learning cards contain different elements of multimedia, from audio to quiz games.

Figure 1. Example of how the learning card works

Evaluation Results

The evaluation results on 15 teenagers revealed that the young learners are able to differentiate the pronunciation in Lun Bawang. For example, one of the respondents mistakenly pronounce the word ‘kerubau’ /kərubəu/ similar to the Malay language ‘kerbau’ /kərbaw/ and the other respondent help to correct the pronunciation then asked the friend to replay the audio and listen to it carefully. Later, the respondent pronounces ‘kerubau’ again correctly. With that, the added-audio feature of the AR-based learning environment allows learners to practice the pronunciation real time. At the same time, most of the learners learned new word. For example, the word ‘tegkang’ that means rainbow in English. They just find out that in Lun Bawang language there is a word for rainbow. They began to query and wonder about other more existed in Lun Bawang language. Other than that, one of the learners can identified the gender in Lun Bawang based on the word ‘kinanak delai’ and ‘kinanak decur’ which means brother and sister. The learners find out that the difference for ‘brother’ and ‘sister’ is just the word ‘delai’ and ‘decur’ and she understand that for a boy is ‘delai’ and for a girl is ‘decur’. Moreover, interaction in the AR-based learning materials is important to attract the learner attention Interestingly, the learners are willingly and are able to memorize some of numbers and words in Lun Bawang then relate it with their presence knowledge for the game. Therefore, the learners do find that the AR-based learning materials for Lun Bawang language is useful and at the same time interesting and fun.

References

MOBILE GAME APPLICATION FOR STUDENT WITH LEARNING DISABILITIES TO IMPROVE UNDERSTANDING ON ADDITION AND SUBTRACTION OPERATION

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Highlights: Learning disabilities are problem that influence the brain capacity to receive, process, analyze and store information. These processing issues can interfere with learning fundamental abilities, especially for math. Fortunately, with different approach and methods in teaching and learning can improve students with learning disabilities to understand and know to count basic mathematic operation. This study focus on development of mobile game application based on line method to help student with learning disabilities understand basic mathematic operational especially addition and subtraction problem.

Keywords: Mobile Game Application, Special Education, Speedline method, Serious Game

Introduction
As mentioned in Vijayalakshmi and Swaminathan (2017) there are four types of learning disabilities as shown in figure 1. Due to the enhancement of learning environment, the conventional way of learning does not satisfy the students with learning disabilities to understand the four basic operational especially addition and subtraction operation.

Figure 1: Type of Learning Disabilities

Peltenburg et. al (2012) proofed that special education students experience many difficulties in solving addition and subtraction operation. Normally, students with learning disabilities show weaknesses in memory and have problem with information processing. Al-Hmouz (2018) mentioned that children will experience difficulty when adding numbers greater than 10 using their fingers.

Speedline Method

In order to teach student with learning disabilities, there are a lot of effort needed and it is difficult to make student understand the basic concept. Pressuring them to perform at a standard time beyond their abilities will only reduce their confidence and make them more difficult to learn.

Therefore, this study proposes new method and new initiative to enhance student understanding on how to perform basic mathematic operational especially addition and subtraction operation for student with learning disabilities. The SpeedLine method is based on line. First, students need to know on how to count from zero to ten. Then student will put the line under the number as shown in figure 2. Student will start counting for each lines.
Step for Addition:
Children should place the line under the number according to the given question number.
Children need to know how to count and write from number 0 to number 9.
When the number 0 or zero is written on the line, the student must provide an additional line under the next number.

Step for Subtraction:
Children should place the line under the number according to the given question number.
Children need to know how to count and write from number 9 to number 0.
When the number 9 or nine is written on the line, the student must provide an additional line under the next number.

Mobile Game Application
Speedline game was developed using Unity engine and delivered into Mobile Game Application. The target audience is students who have basic mathematical weaknesses especially preschoolers, year 1 to 3, special rehabilitation and special education students. This mobile game application will help students to improve the process of learning as well as help students to memorize and do the revision repeatedly either at school or at home. In this study, the game designed fit for students with learning disabilities. A colorful background image and attractive animated button is used as shown in figure 3.

Before starting counting, the first skill that students need to know is counting the number from zero to nine in ascending order as well as from nine to zero in descending order as shown in figure 4.
Discussion & Conclusion
The SpeedLine method help children to solve addition and subtraction operation from one to seven digits. Using line not require the retrieval of stored facts from memory. However, because students are encouraging to do the exercise repeatedly using SpeedLine, it is expected it can be stored in a child’s long-term memory.

SpeedLine method also has the advantage that involve auditory, visual and kinesthetic. Also help children with self-confidence without using finger to count or tally counting. Special education students’ use of SpeedLine in solving addition and subtraction problem up to seven digits. In this case, SpeedLine method is a good alternative for special education to solve addition and subtraction problem.

Acknowledgement
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References
MUMMIE’S LAB STEM OUTREACH BLENDED LEARNING ENVIRONMENT

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Highlights: Mummie’s Lab is a STEM outreach program conducted by university lecturers and students for kindergarten and lower primary school children that adopt play-based learning with 3H principle (Heads on, Hands on, Hearts on). The program utilizes learning spaces in meaningful ways, both hands-on and online. The blended learning adoption is practiced through classroom presence by the Mummie’s Lab team, the involvement of educational community members such as teachers, parents, and university students as facilitators, as well as online presence through a dedicated YouTube channel. The success factor of the program is the accessibility and reproducibility of the content and skills, as well as the wholesome involvement of key learning agents of the children.

Keywords: STEM education, young learners, university outreach, learning environment

Introduction

The need to promote genuine interest for learning is especially required for STEM based understanding, knowledge and skills in very young learners. The adoption of play-based learning with ‘Heads on, Hands on, Hearts on’ principle in young children has been established as one of the most effective approach in instilling the passion and curiosity to build solid STEM foundation. Who best to curate and deliver these content but the owner and practitioner of the knowledge itself, i.e. the university lecturers and their students. The “Let’s Go to Mummie’s Lab” program is one approach to ensure creative and effective methods of STEM content and delivery through blended learning.

Description of the Innovation and its Process

Mummie’s Lab adopts play-based Science and Technology learning system tailored in contextualized learning environment, targeting lower primary school children for both rural and urban schools. The Science and Technology knowledge transferred by university lecturers and students can be understood by the child in a practical setting, such as by doing simple experiments that are suitable for the students at the age of 4 to 12 years old with the help of the students’ family members. The program also imparts the approach and information to educational community members through e-learning using a YouTube channel (Figure 1). The program also encourages the students to learn soft skills by focusing on communication and interaction. At the end of the programs, the students should be able to demonstrate their learning and practice the knowledge transferred.

Figure 1: Copyrighted “Let’s Go To Mummy’s Lab” trademark and YouTube channel accessible at https://www.youtube.com/channel/UCx8lRM3ybns8p1ycyF9xtw
Context and background of Mummie’s Lab physical and online learning modules

The innovation brought forward by this program is the learning of STEM subjects that is reduced and simplified to meet the understanding level of very young children. The program leverages on the concept of utilizing learning spaces in meaningful ways, both hands-on and online. The program that we have conducted have reached multiple years of children, teachers and parents, either through voluntary participation to our programmes in campus or through our outreach programmes at their schools. In overall, various levels of feedback has been received for our review and improvement.

The program essentially goes by the 3H principles (Hands on, Heads On, Hearts On) to ensure effective delivery of the knowledge and thinking skills. The latest effort by the Mummie’s Lab team is to produce online learning videos on YouTube channel to reach out to the parents and children at home. This utilized the blended learning and ‘flipped-classroom’ principles that has been reported to enhance understanding and retention of knowledge.

Importance to education

The programme utilizes the approach and information that could expose and to bridge the gap of knowledge, particularly, the gap between urban and rural school children. This may be of benefit to the educational community members as well in terms of teaching methods and approaches. In addition, the programme also encourages the students to learn soft skills by focusing on communication and interaction. At the end of the programme, students should be able to understand the basic of knowledge learned and most importantly, they have enjoyed learning and should be able to practice similar method at home with their parents. These further emphasize that the aim of Let’s Go to Mummie’s Lab is very much in line with the STEM education movement in Malaysia.

Advantages of Let’s Go to Mummie’s Lab Towards Education and Community.

The main motivation of our innovation is to deliver the STEM knowledge to as many children as possible in the most accessible and innovatively fun and engaging way. Thus the design of modules is centered around household items and DIY-based materials so that any child, parent and family can try them out at home and in school without the direct and physical presence of the Mummie’s Lab team.

The Mummie’s Lab team visit to the schools and their presence in the program, such as the school holiday programmes, are seen as a way to reinforce the learning and to ‘put a face and real life experience’ to the knowledge. This will make the learning event more realistic, memorable and inspiring.

Commercial value in terms of marketability or profitability of Mummie’s Lab.

The designed modules would be able to be commercialized and has the potential to be marketed to wider community of students, teachers as well as parents. Since it is centered around the usage of household items and DIY materials, it has profitability potential as it is simple and affordable as compared to other similar modules in the market. Apart from that, the Let’s Go to Mummie’s Lab STEM module incorporate multidisciplinary themes such as environment, engineering, science, mathematics that would enable users to be part of experiential learning scenario providing opportunities for productive and engaging learning tasks. Such modules are still lacking in the market particularly those that cater for young children in kindergarten and primary schools. Most parents and teachers do not have access to STEM resources and still lacking in knowledge to implement STEM learning hence, Let’s Go to Mummie’s Lab STEM modules would be able to give an introduction and the know-how of STEM. This indication would be able to contribute to potential market and profitability of these modules. The current acceptance and great response that Let’s Go to Mummie’s Lab has received from schools, NGOs, University of Malaya and the ministry (MESTECC) contributed to the marketing and branding of these modules. The Mummie’s Lab team has also received Silver Award at the Malaysia Technology Expo (MTE) in February 2019, signifying the impact of the program.

Table 1: List of Participants and Generated Income of Let’s Go to Mummie’s Lab from 2015-2019

<table>
<thead>
<tr>
<th>Schools</th>
<th>No. of Students</th>
<th>No. of Mentors</th>
<th>No. of Parents</th>
<th>No. of Teachers/Leaders</th>
<th>Generated Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK Convent Kajang (2016)</td>
<td>30</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>250</td>
</tr>
<tr>
<td>SK Convent Bukit Nanas (2)</td>
<td>60</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>250</td>
</tr>
<tr>
<td>SK Satu Sultan Alam Shah 1</td>
<td>38</td>
<td>6</td>
<td>2</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>SK Taman Medan</td>
<td>44</td>
<td>9</td>
<td>2</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>SK La Salle</td>
<td>60</td>
<td>12</td>
<td>2</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>SK Melayu Raya</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>7</td>
<td>250</td>
</tr>
<tr>
<td>SK Bandar Sri Damansara 3</td>
<td>30</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>250</td>
</tr>
<tr>
<td>SK Bangsar</td>
<td>30</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>250</td>
</tr>
</tbody>
</table>
* This is charity-based program

To date, our program has earned interest from private entities such as parents and private and international school members. Most of the paid program participants are among university staffs i.e. the parents, who sends their children during school holiday programs, and summer camps through agencies related to private schools.

Acknowledgement

We are grateful for the funding by Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC), IIRG033A-2019 (The Sciences of Play: Role of Parents Scaffolding in Young STEM Learners) and IIRG033C-2019 (Development of AR-Enabled Fun-Learning Education Module for Young Learners).

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EDUCATION PARADIGM SHIFT: MALAYSIA EDUCATION REFORM FROM WALDORF ALTERNATIVE EDUCATION PERSPECTIVE

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Highlights: In order to face 21st century challenges, 4C (Creativity, Critical Thinking, Collaboration and Communication) is paramount important, not just memorizing the answers and regurgitate in the standardized examination. Hence, experiential learning which involved a lot of psychomotor aspects are vital especially for primary schools’ children, they tend to be active in learning most of the time not just internally in brain but physically (as well emotionally) for ensuring the deep learning. The purpose of this study is to implement an exploratory case study on the psychomotor or physical aspect of Waldorf Education in Malaysia in primary level students in Waldorf Kelip-kelip Care Centre, Rawang, Selangor. This study will be focusing on Waldorf pedagogy, teaching and learnings of Waldorf Education. This qualitative study seeks to gain insights of nature of psychomotor domain/experiences in Waldorf education as embedded in their main lessons, games, sports, art and music studies etc. Therefore, through this exploratory research, researchers shall have face to face interviews with two experienced Waldorf Kelip-kelip teachers (more than 8 years and 12 years experiences), two Waldorf Parents with more than 2 years’ experience in Waldorf Kelip-kelip, 2 days class observations, 2 days Extra Lesson™ workshop and review on students work (20 students). Analysis of data showed psychomotor is relevant and ultimately improve the academic outcome and holistic learning for students and 4C will be major by-product of the learning process. The Waldorf inspired learning process (for fitting into Malaysia education context and community) has infused the psychomotor aspects of learning (which indirectly involved affective and cognitive domains) into integrated transdisciplinary study. Malaysia shouldn’t ignore the education that involved with psychomotor aspects (which at the same time will affect on cognitive and affective) if we would love to be develop country and want to shine in the global world. Psychomotor in this study served a very effective way to have strong foundation for deep learning, active learning, learning how to learn for the students sailing into 21st century smoothly and successfully.

Key words: psychomotor, Waldorf, 21st century learning, 4C, active learning, deep learning

Introduction
Robinson (2010) highlighted that “the current education system was designed, conceived and constructed for a different era. It was conceived in the intellectual culture of the enlightenment and in the economic circumstances of the industrial revolution.” Nowadays, Malaysia Public Education is still organized on factory lines concept: ringing bells, separate facilities, specialized into separate subjects (fragments of knowledge are taught to students and not integrated). We still educate children by batches, we put them through the system by age group. It’s like the utmost important things about them is the DATE OF MANUFACTURE. Hence, Malaysia public education need to be CHANGE, REVAMP and REVOLUTIONIZED to a better model/framework. Waldorf inspired pedagogy could be the reference on having the active learning and deep learning in order to enhance the learning and reduce social wastage.

Description of innovation
Peter Lang (2003) advocated that for the children that learn actively and versatile in movement, it’s the pathway to more skilful thinking. This is the reason where special attention is paid in Waldorf education to ensure that children get much wide-ranging physical movements and activities. To develop the capacity of emotional and psychomotor involvement, Waldorf schools enhance their educational program by integrating the art throughout the curriculum. Artistic activities such as painting, drawing, drama and music infuse every child’s school experience. For example, when students are asked to produce a play out of their study of history, their feeling for time period deepens. While making sets, gathering costumes, (psychomotor aspects are enhanced), and learning lines, they are transported into a special area and become deeply engage in the learning process. By fostering a heartfelt connection between the students and the subject, education become more meaningful and memorable (Petrash, 2002).

DeTAR Putra, Universiti Malaysia Sarawak
Lessons (Theme based
Games
Collaboration
relative. Learning (and
Chinese subject, but he MUST make sentences with certain format only
devices warehoused and sorted into separate
s of stored information and emotion; each piece of
Critical Thinking
Creativity
m
Mathematics
Science
d with
Sports
ions
Communication
b

DeTAR Putra, Universiti Malaysia Sarawak

Hence, to fitting in the local context of Malaysia by Waldorf inspired pedagogy, this learning process has infused the
psychomotor aspects of learning (which indirectly involved affective and cognitive domains) i.e. in a theme based
lesson of Primary 1 of Science Learning, instead of rote learning about teeth, students can first observe the different
kinds of teeth of carnivores, herbivores and omnivore and compare the similarities and differences of the 3 types of
teeth by looking at the real skulls and real animals (which can work in group of two and so on depending on the class
situation), further draw them out with the colour pencils/crayons, without saying right and wrong answers from the
teachers. However, teachers can always ask the students and prompt them on observe the relevant skulls. Then inquiri
the students why they are different and reasons behind it. Follow on by the groups presenting the findings in front of
the class. And some songs can be played to learn about the teeth and also show on how to take care of the human
teeth, and the reasons behind. In the sport and games can incorporate the food chain ie herbivore-> carnivore->
omnivore and so on and then proceed to food web in the chasing games. Field trip can include to museum visits or
to the dentist clinic, etc.

Therefore, the involvement of fine motors skills (drawing, art) and gross motor skills (music and dancing, role
playing, drama, games and sports) and further on the cognitive learning (comparison and contrast of different kinds
of species teeth), it would be very engaging, then the active learning and deep learning in the learners shall happen.
This supported by Falk & Dierking (1997), which argued that “learning needs to be more than just a random assortment
of memories. Learning must involve the use of these memories to solve real-world problems or to connect important
ideas; learning must involve process.” Baddeley, 1990; Roschelle, 1995; Herman and Plude, 1995, commented (as cited in
Falk, et al. 1997, p. 212) “neuro-cognitive-science research demonstrates that the process of learning is not a
simple linear one, but rather a complex series of interactions and feedback loops. It also reveals that the products of
learning (i.e., memories) are not discrete entities, like so many widgets wedgeboard and sorted into separate
compartment in the brain, waiting to be pulled off the shelf at the appropriate moment. Instead, memories are a
tangle of interconnected information and emotions, people, places, things, ideas, feelings and sensations are all
intermixed and intermingled into a single memory. Rosenfield, 1990 and Ceci, 1996 mentioned (as cited in Falk &
Dierking(1997), p. 212) “these memories are assembled and disassembled into images or maps that have no real
beginning or end, that only have personal resonance and meaning in the presence of appropriate contextual cues
and that evolve over time as a consequence of subsequent experience.” Falk & Dierking (1997) clarified that
“memories are the ephemeral grafting together of many pieces of stored information and emotion; each piece of
information and emotion derives from a myriad of sources, and each connects to dozens, perhaps thousands, of other
pieces of information and emotion. In this view, learning (and memory) is not absolute, but relative. Learning (and
memory) is not permanent, but ephemeral. Learning (and memory) is not a product or a process, but a combination of the two. In this view, learning emerges as very hard to document.”

Background of Innovation
Samuel, Tee and Symaco (2017, p.4 & 5) highlighted Malaysia has achieved remarkable success in achieving over 90%
rate of primary school-age students attending school, however, the emerging challenge nowadays is the quality of
Education; Malaysia was placed in the bottom one-third globally in the Program for International Assessments (PISA)
and the Trends in International Mathematics and Science Study (TIMSS) assessments (Samuel et al. 2017). Previous
studies on Waldorf Education has focused on Waldorf pedagogy (Park, 2018), cognitive studies (Friedlaender, Beckham, Zheng & Darling-Hammond,2015; Dahlin, 2017; Jelinek & Sun, 2003; Suggate, Schaughency & Reese, 2013),
art (Hallam, Egan & Kirkham, 2016; Cox & Rowlands, 2000), imaginative teachings (Nielsen, 2006), creativity (Kirkham &
Kidd, 2017; Ogletree,1996). Minimal research attention has been directed especially on psychomotor/physical
aspects. Researchers thinks psychomotor/physical aspect is one of the important domains, which interrelated with
cognitive and affective domain. Unfortunately, most of the time it was ignored, and students did mostly rote learning
in class. Just like the challenges faced by one of the researcher’s son, when they first came back to Malaysia in July
2017, he was sent to neighborhood Primary Chinese School and studying year 1 in second half term, his daily learning
about science was COPYING the UPSR format “answer”, as well for other subjects, a lot of copying work done and
even he is able to make composition in Chinese subject, but he MUST make sentences with certain format only
according to TEACHER’s instructions. This is indeed very worrying, and in order to face 21st century challenges, 4C i.e

Figure 1 Learning Process of Psychomotor that Affect on Academic Outcomes

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Creativity, Critical Thinking, Collaboration and Communication is paramount important, not just memorizing the answers and regurgitate in the examination. Further, many children suffer from lack of movement nowadays due to high level of screen time and heavy commuting in transportation. Subsequently, their gross motor skills and fine motor skills are inadequately developed. “But the human being’s mental and spiritual orientation and balance will be corresponding to their physical flexibility and mobility (Peter Lang, 2003), for those who couldn’t maintain physical balance, they normally have problems with mental balance. This consequently affects the ability to move will affects acquisition of speech, comprehension, and further to infiltrate perception, horizon widening of the kids’ experience.”

Why are they important to education?
Malaysia shouldn’t ignore the education that involved with psychomotor aspects (which at the same time will affect on cognitive and affective) if we would love to be develop country. Psychomotor in this study served a very effective way to have strong foundation for deep learning, active learning, learning how to learn in order to face 21st century needs which often promoted for 4C: Critical thinking, Creativity, Collaboration and Communication. Please write any advantages of your innovation / product development / design / process towards education and community.

Education Paradigm shift from the Prussian way of schooling which is mechanistic and just want to produce of human which follow rules, compliance to rules and have good manner, it seems solely needs teacher to be knowledge transmitting technician/machine instead of become light to ignite the fire of curiosity of the learners. This psychomotor learning process will enhance 4Cs that require in 21st century: Creativity, Collaboration, Communication, Critical Thinking indirectly. Active Learning and deep Learning will take place.

- Education reform model that fits into 21st century demands, learning how to learn skills, 4C in 21st century needs can be packaged and run as a workshop for learners of different age, as well introduce to Ministry of Education Malaysia on Malaysia Education Reform.

Acknowledgement (if any)
We are grateful for Waldorf Kelip-kelip Care Centre which allow us to study on the Waldorf Pedagogy, Extra Lessons, class observations, interviews and review on the student works and all Waldorf professionals who help on us to understand the holistic Waldorf pedagogy.

References

Acknowledgement (if any)
We are grateful for Waldorf Kelip-kelip Care Centre which allow us to study on the Waldorf Pedagogy, Extra Lessons, class observations, interviews and review on the student works and all Waldorf professionals who help on us.

References
DESIGN TOOLKIT

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Highlights:
Study shows humans can only process a limited amount of information at a time, and the most effective way for retention of information is through graphic. However, not all content developers are able to develop and present their information graphically due to limited skills and ability. Hence, the Design Toolkit is developed to assist and guide content developers to create an effective and impactful content for learners. The Design Toolkit is developed based on feedbacks from UiTM lecturers and designers. The toolkit is essentially a single platform that offers arrays of design tools required for online educators. The aim is to develop a simple and hassle free platform for educators and create impactful learning material for online learners.

Keywords: Content Development; Content Design; Teaching and Learning; Online Learning

Introduction
In today digital world, content plays vital role in determining the make or break of the dissemination message or information. A great content design can be a pull factor to engage learner, however a bad content design is the push factor to drive learners away. A study by Ayoob et al. (2019) indicates, users preferred graphically-presented information and are able to complete the tasks fastest using this presentation mode. It is identified that students who used graphically-presented information are able to keep their acquired information longer than students who only used graphics and text (Lyra et al., 2016). This indicates graphically-presented information can better support robust learning.

As learner’s perception on the instructional content depends on the design element that is injected (Ruth et al. 2016). The robust learning cannot be achieved if the content developer is unable to design the graphically-presented information. Hence, this innovation allows content developers to create a more interesting graphically-presented information in order to meet the different psychological learning requirements.

Content
Taking into consideration the ‘multimedia principle’ that states learners are able to learn more through words and pictures rather than words alone (Mayer,2009). It is logical that e-learning content should be developed in graphic forms rather than dumping learners with words. As, humans can only process a limited amount of information at a time, and they make sense of incoming information by actively creating mental representations. However, not everyone has the ability and skills to design, this shows that most information uploaded in the present e-learning platforms are in the form of words. Despite the proliferation of design tools online, content developers might get discombobulated with the amount of information in the world wide web. Therefore, this product acts as a platform that gathers all necessary tools for content developers. The product aims to create a simple and effective design toolkit. The toolkit consists of:

- Creativity
- Typography
- Branding
- Delivering presentations
- Color Wheel
- Image Editor
- Resizing
- Format

The Design Toolkit will not only act as a single design platform, it will also be able to create a more creative educator and evidently able to produce an impactful learning material. This will not only be beneficial for the content developers but also the learners at large.
This product is developed based on feedbacks gathered from UiTM educators, and currently being used by UiTM lecturers.

Acknowledgement
We are grateful for the Institut Pendidikan NEO (iNED) Universiti Teknologi MARA for the financial support. We are also grateful for all of the feedbacks from fellow UiTM educators which allowed us to create this design toolkit.

References


TRANSFORMING CLASSROOM WITH GOOGLE HOME FOR THE 21ST CENTURY LEARNING

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Highlights: Teaching 21st century students are a very challenging task for teachers. Information is just at the tips of the students’ fingers. Voice assistant while teaching is a great tool for teachers to assist them in facilitating teaching and learning activities for the new generation. There are a couple of existing devices available and one of them is Google Home.

Even though its primary purpose is for home users, it can also be used by teachers to search for information simultaneously while conducting teaching and learning thus creating enjoyable classroom environment.

Keywords: Google home, Google assistant, Classroom automatization, Voice assistant, Learning Space

Introduction
Voice assistant is a device that can interpret human speech and respond via synthesized voices. Google’s Assistant, Apple’s Siri, Amazon’s Alexa and Microsoft’s Cortana are the most popular voice assistants embedded in smartphones or dedicated home speakers. Users can ask the assistant questions, control automation devices, play media, manage other basic tasks such as emails, to-do lists, scheduling appointments and organizing calendars with verbal commands.

These creative features should be incorporated in the 21st-century learning space as part of its features to assist teachers and learners during teaching and learning activities. Our team promotes the utilization of the voice assistant devices among our lecturers and provide training for this purpose. We will demonstrate the features of Google Home, using some applications and its potential use that can help teachers in their classroom.

Content
Google home was initially designed for a smart home. However, it can also be used in learning spaces i.e. classroom. By using voice command, we can control our learning and learning environment. We can ask questions, turn on and off classroom lights, play music or video and many more by using voice command. As teachers, we can also use the device to help us in teaching and learning activities. We can set a timer and alarms, do basic mathematic calculations, etc.

It is estimated that 75% of the world population will own a voice assistant technology by 2020. 3 out of 4 households are forecasted to own the device up from just 7% in 2016. That’s over 94M units. The voice assistant is a futuristic device therefore it can cater 21st Century students’ needs. Even though there are some functional limitations for the current devices, industries will keep on improving its functions.

At the current moment, Google home is able to perform many things. It includes answering basic informational queries, set timers and alarms, create calendar entries, set reminders, make lists, and do basic math calculations. It can also control media playback from connected services such as Amazon, Google Play, iTunes, Pandora, Netflix, and Spotify, control Internet-of-Things-enabled devices such as thermostats, lights, alarms and

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References
XPRO-TUTOV; E-SUSTAINABLE STORY FOR ALTERNATIVE TEACHING, LEARNING AND ASSESSING

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Highlights: The project of Experimental Procedure Tutorial Video (XPro-TutoV) is an online video prepared by a group of students as alternative materials for teaching, learning and assessing. XPro-TutoV is design by heutagogical, cybergogy and peeragogical approaches. The students are exposed to the self-determined learning, lifelong education and learning from others whereby the lecturer as a facilitator throughout this project. XPro-TutoV is dynamic and sustainable and applicable to a various science and technical field through some modifications. This project also towards providing the quality education and IR 4.0 and fulfill the nation needs for a better achievement in knowledge sharing and globalization.

Key words: Alternative, evaluating, learning, teaching, and sustainable.

Introduction
Generation Z - typically, described as those born post-1995 - are the current generation of college-bound students, with the oldest already entering the workforce. According to the U.S. Census Bureau, Gen Z makes up 25% of the population, outnumbering Millennials and Baby Boomers, with an annual consumption of $44 billion. As educators, how much do we really know about them? Here’s a starting point: Gen-Z is not millennia. They were born with the internet at their fingertips and are extremely comfortable with rapidly evolving technology. Their use of social media depicted below shows vastly different preferences from millennial.

In another point, for engineering or technical subject, the hands-on learning activities are practices throughout the teaching and learning (T&L) activities. Based on this, the numbers of equipment and instruments are needed to be used during the T&L. It will become a problem to handle a high number of students when the institution cannot provide the amounts of equipment and instruments during the T&L due to cost and manpower. The students need a lot of time to do their hands-on or practical work because they need to wait for the turns. Previously observed, this will make the students lost their focus especially for Gen-Z.

Regarding the two issues, Experimental Procedure Tutorial Video, XPro-TutoV is an alternative design for new teaching, learning and evaluating video approach based on heutagogy, cybergogy and peeragogy was introduced in this project.

Design
A video for an alternative namely Experimental Procedure Tutorial Video, (XPro-TutoV) was design for e-sustainable story for teaching, learning and evaluating. A design of XPro-TutoV is depicted in Figure 1.
Figure 1: Design of XPro-TutoV

Acknowledgement (if any)
We are grateful for opportunities and grant from the Pusat Pengurusan Kualiti Akademik (PPKA) Universiti Malaysia Terengganu to participating in IUCEL2019.

References
EMPOWERING 21ST CENTURY LEARNERS THROUGH THE USAGE OF MY ELECTRONIC VISUAL & AUDIO (MYEVO) IN THE 21ST CENTURY LANGUAGE CLASSROOM

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Highlights: MyEVO is a revolutionised self-directed learning module with the main intention of helping learners to acquire the language (specifically listening skill) through the combination of current and up-to-date technology - the Augmented Reality (AR) and mobile applications, where learners no longer need to rely on teachers to play the listening audio in class through the use of old-fashioned and traditional computers or CDs. By using their own smartphones, earphones and internet mobile data/ institutions’ wireless, they can now do listening practices at their own pace by scanning the pictures in the module that trigger the AR technology and answer the questions that follow. Another key feature of this self-directed learning module is the platform provided for its users to engage with the global context in line with the 21st century learning, named as ‘MyEVO community’. MyEVO users can share their views and opinions on the Higher Order Thinking Skills (HOTS) questions with the other users all over the world. This is not only to encourage the learners to be active in their learning but also help them to understand other people’s perspective about the issue being discussed in the practice.

Keywords: augmented reality (AR), listening practices, self-directed module, video media

Introduction

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

In the past decades and even until today, listening lessons were challenging to be conducted with the use of radios where teachers played cassettes or CDs for the audio to be listened to by the students. Teachers or even students on the other hand, had difficulties to select specific tracks on the cassettes or CDs (e.g. replay or pause the audio) during the listening activities. In contrast, the present listening practices in the classroom can now be conducted using any devices that have internet connection such as that of computers. This current approach of conducting the listening practices is still considered as a traditional method due to the evolution of the handheld devices and the rapidly evolving internet speed.

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

Adopting the video media theory by Gruba (1997) as a foundation for the development of this module, authentic videos based on meaningful, real life situations were utilised as the fundamental materials. This theory supported the statement made by Prensky who wrote about the digital native learners that prefer the incorporation of multimedia as part of their learning tools. These learners spent their entire life surrounded by technologies and engaged themselves in social media platforms. They scrolled their Facebook, Instagram, Twitter and etc., watching updated videos about anything whenever they want. Therefore, the development of this module tailored the learners’ need and suited the millennial learners who already equipped themselves with the IT knowledge. It is hoped that the development of this module will shed light on the new era of teaching, learning and practising learners’ listening skills in English language learning.

Content

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

In the second language classroom where the skills in listening are concerned, the application of advanced technology in teaching is undeniably possible as today’s learners are readily equipped with smartphones and Internet connection. Thus, to be relevant with today’s situation, a model of listening practices that allow students to listen and also watch the movements and gestures of the characters in the audio (video media) is demanded. MyEVO is recommended as it is an innovation of a self-directed listening module that integrates the use of Augmented Reality (AR) and mobile applications as to give an interactive experience of a real-world environment to the learners in practicing their listening skills.

MyEVO consists of 15 sets of practices covering a variety of topics that are relevant to the students’ interests. Each set of practice is accompanied by 1 ‘Augmented Reality (AR) trigger image’ that links the students to the video in ‘MyEvo aura’ page (the students has to download the HP Reveal application before they can get access to and follow ‘MyEVO aura’ page), 5 listening comprehension questions, 2 Higher Order Thinking Skills (HOTS) questions and 1 QR code that links the students to ‘MyEVO community’ page. For listening comprehension questions, students can circle the correct answers on the module itself. While for the HOTS questions, students are required to submit their answers on ‘MyEVO community’ page where all responses submitted by all MyEVO users can be found on this interactive page. The ‘MyEVO community’ page can be accessed by scanning on the QR code attached together with each of the practice.

Importantly, through the incorporation of audio and moving visual image (video media) in completing the practices, the module is a relevant tool that meets the current learning motivation and interests of the digital natives. It provides the students with authentic language use related to every day’s issues that are not scripted, and in a controlled learning environment. Moreover, the listening activities that occurred in MyEVO utilizes the audio as well as visual modes whereby students get to listen to the language used as well as watch the video of the given contexts. Hence, the dual modes of learning process help the students to maximize their understanding of the language used within the authentic contexts portrayed. The value aspect of the listening materials has also been embedded in the module as to be relevant to the current revolution of Education 5.0 that injects the moral lessons to the learners. It is also to give an interactive experience of a real-world environment to the learners in practicing their listening skills. Hedge (2008) states that in this age of science and technology, the majority of the learner possesses Android or iOS sets and mobile phones for a wide variety of purposes. Therefore, to be relevant with today’s advancement of technology, listening practices should be considered to be conducted through mobile application where students only need smartphones, earphones and Internet connection. Teachers, on the other hand, are only required to provide the modernized version module with current technology advancement such as Augmented Reality Based learning and QR code that direct the students to the listening video media. All in all, MyEVO is an empowering tool that allows students to explore the language via its listening practices that are not only easy but also interactive!
References


CLOUD-BASED SMART ATTENDANCE FOR ENGAGEMENT ANALYTICS

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Highlights: Cloud-based smart attendance is a novel tool that integrates comprehensive student engagement in the attendance taking process. It is very simple and practical to be adopted by educators for blended learning strategy. It is designed to promote cognitive, emotional and behavioral engagement of the student in the class. With analytics-ready capability in this application, it is very practical for implementing engagement analytics. Since the application is hosted on the cloud platform, it is very potential for global-scale adoption to improve the quality of education in meeting the sustainable development goals (SDG) 4.

Keywords: Smart attendance, cloud services, engagement analytics, emoticon

Innovation Description

Cloud-based smart attendance (CBSA) is a simple online form created with cloud service and easily can be embedded in any web-based learning management system. The uniqueness of this innovation is the integration of learner profile, learner emotion, learner reflection and learner feedback (Figure 1).

Figure 1: CBSA Process Model, Visual Model and Data Model

Since this application is hosted on the cloud platform, it is accessible from any Internet connected devices and in this study, students can easily access the application using their smartphone to sign in their attendance at the end of the class session.

Context of Innovation

Student attendance is a very important indicator in measuring blended learning approach since the approach still require physical presence of both teacher and student (R. Boelens, S. Van Laer, B. De Wever, 2015). Previous studies (Benyo, Sodor, Doktor, & Fordos, 2012; Bijmans & Schakel, 2018) revealed that class attendance has strong relationships with class grades and Grade Point Average (GPA). These studies used attendance data as evidences to indicate student did attend or physically presence in class. However, it did not indicate student engagement in class. Student engagement can be categorized into three dimensions (Fredricks, Blumenfeld, & Paris, 2004) which are: - behavioral engagement: students’ participation in education, including the academic, social and extracurricular activities of the school emotional engagement: students’ emotional reactions in the classroom and in the school (a sense of belonging or connectedness to the school) cognitive engagement: students’ investment in their learning (motivation and self-regulation).

Existing attendance system especially manual signature disturbed student’s attention since student need to write down their initial by queuing. Technology based attendance system like QR-code (Masalha & Hirzallah, 2014), radio
Significance of Smart Attendance in Education

Although there are advanced systems (Islam, Hasan, Billah, & Uddin, 2018; Sunaryono, Siswantoro, & Anggoro, 2019) for managing student attendance, the goal is to capture attendance data per se. It does not about promote student to do self-check, reflect and learn to provide feedback as proposed in this cloud-based smart attendance. Self-check and reflection are cognitive behavior that promotes deeper learning, more complex and integrated knowledge structure (Kori, Pedaste, Leijen, & Måeots, 2014). Although there is literature claim that reflection does lead to an improvement in academic performance (Cavilla, 2017; Ndiewo, Raburu, & Aloka, 2016), reflection itself is essential for living with a growth mindset (Korstange, 2016). Therefore, this smart attendance is capable to promote cognitive engagement in a blended learning environment.

This smart attendance also integrates the capability to capture student emotional status. By using existing emotional icon or emoticon available over the Internet, instructors are free to choose a variety of graphics representing the type of emotion. This simple yet familiar approach to capture emotion in the blended learning settings has potential novelty since most of the study to assess emotional engagement typically measured by using survey and interview (Gunuc & Kuzu, 2015; Manwaring, Larsen, Graham, Henrie, & Halverson, 2017; Wilson et al., 2015). Due to the dynamic nature of emotion, such assessment or data collection strategy could not provide contextual information to the learner and the instructor. Therefore, this smart attendance is capable to capture emotional engagement data in a contextual manner and potential to provide information or insight with data analytics by associating the emotion with the type of learning activity, time, venue and other parameters that available. This is a significant impact in advancing blended learning domain especially by adopting data analytics (Picciano, 2014).

Blended learning approach still requires a physical meeting of the instructor and learner. Attending physically the class session is the indicator of student behavior engagement. Like other existing digital and advance attendance system, the summary of student attendance can provide the level of student behavior engagement in class. Since the system is on the cloud and accessible through the Internet, there is the possibility of the student may sign in without attending physically in the class. To minimize the risk of a cheating case to happen, the system includes the phrase or keywords of the day which will be informed by the instructor at the end of the class. The keyword required in the system functions for two purposes; the first is to allow only those who physically attend the class can fill the form. The second is for an instructor to promote inspiring moments by using positive keywords or phrase. Although there is literature claim that reflection does lead to an improvement in academic performance (Cavilla, 2017; Ndiewo, Raburu, & Aloka, 2016), reflection itself is essential for living with a growth mindset (Korstange, 2016). Therefore, this smart attendance is capable to promote cognitive engagement in a blended learning environment.

Although this smart attendance capable to promote the whole context of student engagement, the success of the educational strategy lies in how simple it is for an educator to adopt. Cloud technology is meant to simplify the complicated issue or technical knowledge requirements in meeting the goal or purpose of the end-user. Since this smart attendance is using Google cloud services (Cahill, 2011) which is freely available for public education institution globally, that’s mean this smart attendance model can be scale up and adopted by other educators globally. In short, this innovation has a big potential for large scale adoption in improving the quality of education in meeting sustainable development goals (SDG) 4.

Advantages to education and community

There are many advantages of adopting smart attendance on cloud services. The advantages of the cloud-based smart attendance system are as follow:

- **Scalable**: Smart attendance is hosted on the cloud and accessible with web browsers. This system can be accessed with any Internet devices with a web browser such as a computer, smartphone, smart TV or even in-car entertainment.

- **Reliable**: Google’s application and network architecture are designed for maximum reliability and uptime. This means the smart attendance can be accessed by a large number of users in a time which ensure zero interruption of a user to access.
Analytics ready: Smart attendance is using Google Form. The data captured is ready in spreadsheet and analysis can be made on a real-time basis. This cloud-based spreadsheet is also ready with external data integration where an educator can integrate the academic performance data in measuring the relationship between engagement and performance. The report can be fully customized and online dashboard or report can be shared with specific users or published on the web for public access.

Low-cost: The Free Google Suite EDU for institution comes with the benefit of unlimited storage for Google Drive. This means the cost of hosting the system to execute and storing attendance data with Google Suite EDU will not become an issue for the institution to adopt it.

Simple and practical: Smart attendance requires no special hardware like sensors or readers. It only requires a device that equips with web browsers and Internet access. To access the application, the link to the system can be embedded in existing Learning Management System (LMS), social networking sites like Facebook or through social networking apps like WhatsApp.

Fully customizable: Smart attendance can be created as templates and shared with others. The template can be customized by other educator or community like changing the language, remove or add other items for the system.

Table 1: Advantage of Cloud Based Smart Attendance for Educator and Community

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Educator</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase productivity/saving time</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Impactful attendee engagement strategy</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Digital copy of attendance proof attendee</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Data driven decision making with data analytics</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Efficient event organizing</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Paperless working environment/save cost</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Digital habit for Industrial Revolution 4.0</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Convenience online access</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Commercial Value
The commercial value of cloud-based smart attendance is not on the technology itself since Google cloud services can be freely registered by the education institution or community. The potential commercial value of smart attendance is the fees for professional and technical consultation should institution required major customization and integration with their existing information system or advanced functionality like designing a dedicated dashboard for decision making.

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References

DeTAR Putra, Universiti Malaysia Sarawak


DECOLOURAR: AN AUGMENTED REALITY AQUARIUM COLOURING LEARNING BOOK

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Highlights
Augmented Reality (AR) has come into the picture to be implemented into the educational purpose for assisting students in their learning process. DeColourAR, an interactive real-time coloring tool, using AR technology has been developed to provide a more interactive and interesting real-time coloring environment for students. It helps students to visualize abstract concepts while learning thus improve their coloring skills. Students can view the information that they color including the animated 3D models based on their color choices. Since students often face problems in visualizing the coloring of the objects, especially to understand concepts which are abstract and not visible in our daily life, hence DeColorAR has its potential in aiding learning processes of the student to visualize an object in 3D space.

Keywords: Augmented Reality, Real-time Colouring Environment, Aquarium Learning Book

Introduction
In this product, technology, called Augmented Reality (AR) is applied with minimal tools to bring as personal contact card but virtual purposes. This new approach is to assist the users to resolve psychological difficulties interactively using AR technology besides the conventional exchange of basic information with new people in the first meeting approaches. AR is a new technology where its goal is the seamless presentation of computer-driven information with a user’s natural perspective of the world. AR interfaces typically involve the overlay of virtual imagery onto the real world. AR technology offers a potential solution by combining real-world features with virtual objects generated by the computer to augments the scene with additional information that enhances a user’s perception and interaction with the real world. This type of new approach is driven and relies heavily upon two (2) major aspects: social communication and the freedom to maintain individuality in a real private space. This project will also demonstrate the possibility of augmenting user’s drawings in real-time by using AR technology in the aspect of technicality. The transformation of coloring book into interactive coloring book demonstrated in this project will also give insight to the researchers and developers on the potential and advantages of AR technology so that more researchers or developers can make use of the technology and creating more useful products not limited to the coloring book. Thus, it might help other researchers to think about more AR application that can improve the current living style to be better. As a result, the ultimate goal of AR which creates a convenient as well as a natural immersion to the users can be reached in the coming future very soon.

Commercial Potential:
Marine Aquarium and Museum, Borneo Marine Research Institute, UMS
Information Broadcasting Network (M) Sdn Bhd, Kuala Lumpur
Edanea Augmentic Enterprise, Kuala Lumpur
Sabah Tourism Board, Sabah

Environmental Friendliness
The application is applied with minimal tools to bring during the colouring class. Its goals are to provide a seamless presentation of computer-driven information with a user’s natural perspective of the world. The book is printed with vegetable-based ink which ECO environmental friendly technology. Therefore, it is suitable and safe to use for kids.

Recognition

Malaysian Technology Exhibition (MTE) 2017, PWTC Kuala Lumpur, 16-18 Feb 2017 (Gold Medal Award: Mobile Augmented Reality Colouring Book).
InTEXUnimasR & D Exhibition 2017, CAIS UNIMAS, 17-18 May 2017 (Silver Medal Award: Mobile Augmented Reality Colouring Book).

Intellectual Property/Copyrights:

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Copyright of Mobile ARUT Android Browser™ Version 1.0, Universiti House, UNIMAS, 14 September 2012

Acknowledgement
Universiti Malaysia Sabah
BASIC MEDICAL SCIENCE SMARTUMS: ANATOMY & PHYSIOLOGY COURSE FOR NURSES: PROVIDING STUDENTS WITH THE BEST LEARNING EXPERIENCE

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Abstract: A good understanding and application of human anatomy and physiology is a pre-requisite knowledge for first-year nursing students. As one of many nursing ‘core’ modules, anatomy and physiology have been taught either as a stand-alone course or integrated into clinical nursing courses. The reason is that anatomy and physiology courses will scaffold nurses’ understanding of pathophysiology, clinical assessment and many nursing procedures (Amy, 2010). However, these ‘basic’ medical courses remain a difficult challenge for many nursing students, undertaken with considerable trepidation because of the typically high fail rates and due to the breadth and depth of new complex information presented (Courtenay, 1991). Majority of 80-90% nursing students in University Malaysia Sabah reported as being fearful of biological sciences and having difficulties in applying anatomical and physiological information during their clinical practicum. Thus, the demands to change the traditional methods of delivery for this course to online learning is very essentials.

Keywords: online nursing, human anatomy, Online course nurse, nursing education, student nurses

Introduction

Human anatomy and physiology course one of nursing ‘core’ modules which represent as a pre-requisite knowledge for all first-year nursing students. Detailed knowledge of where, as well as how, to palpate, percussor auscultate is essential for adequate assessment, formulating an accurate nursing diagnosis, provision of nursing intervention and ongoing care of patients. Being as one of the nursing ‘core’ modules, anatomy and physiology are listed under basic medical science course category in professional board standard curriculum. The nursing program in Universiti Malaysia Sabah offer this course as a stand-alone course and integrated into clinical nursing courses. The reason is that anatomy and physiology courses will scaffold nurses’ understanding of pathophysiology, clinical assessment and many nursing procedures (Amy, 2010). Despite the entry requirement of this program is science or biology, majority of nursing students in University Malaysia Sabah still report as being fearful of biological sciences and having difficulties in applying anatomical and physiological information during their clinical practicum.

Background of Basic Medical Science course

The study of anatomy has relied heavily on surface learning of superficial anatomy which means with primary text, mannequin, and cadaver to enable a deeper understanding of anatomical information (Goldschmidt & Greene-ryan, 2014). For the past 10 years, the delivery of this course is mainly using traditional methods. Only after the launching of smart2UMS, the method of delivery has changed slightly, from teacher-centered to student-centered. On top of smart2ums, the massive open online course had been launched to steer the technology enable learning not only for UMS nursing students but also for a bigger nursing students’ population. E-learning or online learning is used increasingly in healthcare professionals’ education. It is referring to internet-based forms of learning, rather than face to face interaction and where traditional methods of learning are supported by online resources (McKenzie & Murray, 2010). According to social learning theorists, learning changes identity. For example, after students learn a new piece of knowledge, they develop new skills which enable them to be more confident during performing the nursing procedure. Alternatively, it may incorporate a major shift in the concept of self from, for example, from a nursing student to a qualified nurse. McKenzie & Murray (2010) added several processes to help this identity shift. As well as providing the factual information that underpins the nursing profession, nurse education also teaches the unwritten rules, ways of behaving, styles of dress and artifacts that are important to the community. These aspects are often not taught explicitly; instead, students observe them when they come into contact with members of the nursing community of practice. Research has shown, for example, that observing short online video clips of staff showing how to deal with a range of difficult clinical situations can be as effective in increasing student nurses’ rated self-efficacy as receiving a lecture (McKenzie & Murray, 2010). One reason for this success likely is that the learning is placed firmly in the clinical context. This allows the students to observe directly the staff members’ practice, rather than merely hearing about it second hand in a lecture.
CONTENT:

Background
The development of this course through smart2UMS platform is inspired by Youtuber: Amoeba Sisters.

Development of BASIC MEDICAL SCIENCE

It is undeniable that there’s a lot of concepts in medical is very difficult to understand. At this stage, mode of delivery of this course was using a blended learning method e.g. face to face lecture, lecture slide, additional reading material, YouTube link was then uploaded in the smart2ums platform and online quiz to measure students understanding of the topics. Despite all of this effort student engagement and understanding of the topic is still need a lot of improvement. The challenge to the author is, how to make students attract and engage to a video lecture and on the same time the learning take place.

Create and design a professional identity for Basic Medical Science. This is very important because student is very easy to remember something ‘pictorial’.

Tools used for designing is Microsoft Power Point.
This course consists of 7 topics which includes Introduction to human anatomy, cell, division of cells, plasma membrane, active and passive movement, homeostasis and body fluid compartments. Each lecture topics will be divided into 3 parts for video recording. Each video recording was set between two to five minutes per section.
Tool used for video lecture recording is full version Screencast-O-Matic 2.3.2 and build in Dell microphone.

In order to ensure the video recording is organizing and smooth, script for each section was narratively done by author. This is to minimize distraction and student will be more focus on what they see in the screen and what they hear from the recording. The following picture show the author on-the-go ‘mini studio’. The script is place at the corner left and video lecture is on the right side.

DeTAR Putra, Universiti Malaysia Sarawak
Once recording completed, background sound added (built in Screencast-O-Matic). The background sound of this software had been designed to fade in and out automatically if the recording on simultaneously. Complete video recording uploaded to You Tube channel owned by author. Basic Medical Science folder is created. Students can have an access all the video recording via this platform. Students understanding about this topic will be assess via quiz/ question created by author. Students will be able to track their performance in every section. Upon completion of all the topics, students will be awarded a certificate of completion.

**Effectiveness of online course used**
In order to measure the effectiveness, at the end of the semester student will rate the module via Sistem Maklumat Pelajar via Module Feedback. The figure below showed positive response given by the student for this module.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Sum</th>
<th>Sum Mean</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>A PREPARATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Briefing on course/syllabus at the start of semester</td>
<td>4.58</td>
<td>4.49</td>
<td></td>
</tr>
<tr>
<td>2. Written information on course implementation</td>
<td>4.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Appropriateness of course content with learning objectives/outcome</td>
<td>4.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B DELIVERY OF LECTURES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Use of audiovisual aids by lecturer</td>
<td>4.35</td>
<td>4.42</td>
<td></td>
</tr>
<tr>
<td>5. Clarity in delivery of lectures</td>
<td>4.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Ability of lecturer to attract and sustain students’ interest on the subject</td>
<td>4.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C ASSESSMENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Variety of assessment methods</td>
<td>4.33</td>
<td>4.44</td>
<td></td>
</tr>
<tr>
<td>8. Appropriateness of marks allocate for each assignment or task</td>
<td>4.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Feedback from lecturers regarding results of examinations and assignments</td>
<td>4.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D LEARNING OUTCOMES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Enhanced knowledge</td>
<td>4.4</td>
<td>4.35</td>
<td></td>
</tr>
<tr>
<td>11. Improved competency</td>
<td>4.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Positive change in attitude and behavior</td>
<td>4.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E FACILITY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Conductive learning environment</td>
<td>4.3</td>
<td>4.33</td>
<td></td>
</tr>
<tr>
<td>14. Availability of references resources</td>
<td>4.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Equipment for teaching and learning</td>
<td>4.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A+B+C+D)/5</td>
<td></td>
<td>4.43</td>
<td>4.33</td>
</tr>
</tbody>
</table>
Importance to nursing education

After uploading all 22 video topics in the YouTube channel, most of first year nursing students responded positively and some of students commented that easier to learn and uploading time watch the video lecture is very fast. More improvement can be carried out to increase student interest and engage via this platform. For example, to add on graphic and animated character in the video lecture so that the Basic Medical Science smart2ums platform look more welcoming. It is believing that, with this positive feedback from our students, their perception towards this course will change.

Marketability of this project

Nursing is a global profession; the education of new practitioners and the dissemination of the knowledge of nursing science impacts the health of all people. RN-to-BSN (registered nurses to higher degree students), non-traditional learners with competing life priorities, are more likely to enroll part-time, less likely to take face-to-face courses and frequently need extra support. Online learning is changing the face of higher education. Online programs provide nurses with access to technologies, networking with other professionals, and opportunities reflect on their practice. The changing climate of online, higher education provides access and flexibility to students balancing work, family, and financial responsibilities. Offering free courses may provide nursing students ambivalent about online learning the chance to experience otherwise unavailable educational opportunities including the chance to earn a BSN degree (Goldschmidt & Greene-ryan, 2014).

Benefit to the communities

Allows learners to learn in their own time and place (Mohamed Ali, 2016)
Students appreciate the flexibility and convenience of being able to work in their own time and location without the need to travel (Mohamed Ali, 2016)
Allows learners to be self-directed, it also provides them with the ability to connect online to download resources that are essential for their educational requirements (Ling & Moi, 2007)

Acknowledgement

We are grateful to MOHE; Universiti Malaysia Sabah; Centre of e-Learning UMS Prof Fong Soon Fook, AP DR Kenneth Rodriguez, Mohd Zulfadhlee Abdul Nasyir and all PEP UMS team; Dean Faculty of Medicine & Health Sciences (FMHS) and FMHS e-learning committee for their endless support, sharing technical expertise, collaboration and encouragement.
References


TRANSFORMING CLASSROOM WITH AMAZON ECHO DOT FOR THE 21st CENTURY LEARNING

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Highlights: Teaching 21st century students is a very challenging task for teachers. Information is just at the tips of their students’ fingers. Voice assistant while teaching is a great tool for teachers to assist in facilitating teaching and learning activities for the new generation. There are a couple of existing devices available and one of them is Amazon Echo Dot. Even though its primary purpose is for home users, it can also be used by teachers to search for information while conducting teaching and learning thus creating enjoyable classroom environments.

Key words: Amazon Echo Dot, Alexa, Classroom automatization, Voice assistant, Learning Space

Introduction

Voice assistant is a device that can interpret human speech and respond via synthesized voices. Google’s Assistant, Apple’s Siri, Amazon’s Alexa and Microsoft’s Cortana are the most popular voice assistants embedded in smartphones or dedicated home speakers. Users can ask the assistant questions, control automation devices, play media, manage other basic tasks such as emails, to-do lists, scheduling appointments and organizing calendars with verbal commands. These creative features should be incorporated in the 21st century learning space as part of its features to assist teachers and learners during teaching and learning activities. Our team promotes the utilization of the voice assistant devices among our lecturers and provide training for this purpose.

We will demonstrate the features of Amazon Echo Dot using some of its applications and the potential uses that can help teachers in their classroom.

Content

Amazon Echo Dot was initially designed for smart home. However, it can also be used in learning spaces i.e. classroom. By using voice command, we can control our learning and learning environment. We can ask questions, turn on and off classroom lights, play music or video and many more by using voice command. As teachers, we can also use the device to help us in teaching and learning activities. We can set timers and alarms, do basic mathematic calculations, etc. It is estimated that 75% of the world population will own a voice assistant technology by 2020. 3 out of 4 households are forecasted to own the device up from just 7% in 2016. That's over 94M units. The voice assistant is a futuristic device therefore it can cater to 21st Century students’ needs. Even though there are some functional limitations for the current devices, industries will keep on improving its functions.

At the current moment, Amazon Echo Dot is able to perform many things. It includes answering basic informational queries, setting timers and alarms, creating calendar entries, setting reminders, making lists, and doing basic math calculations. It can also control media playback from connected services such as Amazon, iTunes, Pandora, Netflix, and Spotify, control Internet-of-Things-enabled devices such as thermostats, lights, alarms and many more.

Acknowledgement

We would like to thank our Dean, Professor Dr Shaiful Bahari Ismail and our head of department, Associate Professor Dr Muhamad Saiful Bahri Yusoff for their encouragement. Without their support, this teaching innovation would not be successful

References

LEARNING BIOCHEMISTRY THROUGH A GAMEPLAY MODEL

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Highlights: The innovation introduces gameplay into learning activities to engage, immerse and involve students into learning as well as to foster interaction between students when completing the activities. In addition, the learning activities incorporate game elements e.g. competitions, badges, progress, scoreboard, levels and awards to create fun, competitive and focused environment among students. The gameplay is used as a mentoring and monitoring tool for the educator while the students gain immediate feedback to improve learning performance. The content of the games were developed to meet the intended course’s learning outcomes which assessed the cognitive level of the students.

Keywords: Game-based Learning, game mechanics, play and learn.

Introduction

Biochemistry is a course that requires students to grasp concepts that are sometimes difficult to comprehend. Some students sort to memorize them without understanding their meanings. This, in turn, will create a ‘stressed’ environment in the classroom since the students struggle to do well relying only on their ability to memorize. Thus, this innovation creates a more relaxed and fun class making use of what the Gen Z students do best, technology-reliant, learn by doing, enjoy interactive classrooms instead of traditional dissemination teaching method and expect that learning can take place any time and any where (Kozinsky, 2017). Furthermore, Gen Z students are visual and challengers (Pruitt, 2017). Thus, taking all these into considerations, a game-based learning model is developed for Biochemistry.

Why games? Games can be used as a less stressful way for students to demonstrate their knowledge, skill and understanding of a topic. Being less stressed will help students to have a more positive perception of their learning environment and give a true indication of their own learning (TeachStarter, 2017). Play is also a form of cognitive exercise that can improve cognitive functions such as memory and judgement.

In this innovation, students participate in various learning activities as a form of challenges such as being an active learner during class (e.g. asking and answering questions), completing gameplay, completing gameplay in first place, generating the best idea, completing peer teaching activity, achieving a mark between 75-100% in the Mid Semester Exam and Lab Practical Test, participate in class surveys, and being elected as class representative. For gameplay, Web 2.0 tools were used to generate quizzes based on Biochemistry topics which include Quizalize, Educaplay, Quizizz, Socrative, Kahoot! and Metaverse AR. These educational technology tools are interactive and can be played any time and any where. In addition to being the fun part of the process, these tools can also be used to monitor the student’s performance or as an intervention tool since they provide comprehensive analyses on the gameplay. Students can also gain immediate feedback on how they perform throughout the learning process after completing the gameplay. By repeating the same gameplay, they can improve on their performance without being penalized. To ensure that there are face-to-face interactions among the students, gameplay in the form of a case study-based treasure hunt, Met-Brainy, was introduced. To make it more interesting, various Participation Badges were given to students to acknowledge their work. The myriad designs of badges up for grabs by the students can be a visual attractor for the students to engage in learning. The badges earned are shown in the student’s dashboard at Oceania eLearning@UMT, a LMS platform for undergraduate students set up by UMT. Through this, students can keep track of the number of badges earned so far. These badges were then grouped into 5 Competency Level Badges based on the number of Participation Badges earned. This type of badges classified the students into either a Novice, Beginner, Competent, Proficient or Expert Biochemistry learners. Students have access to their friend’s Competency Level Badge earned via a BIO3101 Badge Board. By showing this, a competitive environment among the students is created. Badges earned can also ensure involvement of the students in learning and to motivate students to do well. At the end of the semester, a student who earned the most number of Participation Badges was given a Certificate of Achievement and a surprise gift. This is set as the ultimate goal that the students can achieve.
Fig. 1. The number of students achieving the CLO1 marks above and below the threshold value set for competency level (i.e. 50%).

It was observed that, the number of students who obtained more than 50% marks on CLO1 increased from 60% to 76% to 96% (Fig. 1) over three different semesters: (a) Semester I 2017/2018, before innovation is introduced, (b) Semester I 2018/2019, after innovation is introduced, and, (c) Semester II 2018/2019, after modification of innovation. 50% is the threshold level set to measure the competency of students to achieve intended learning outcome with >50% signify competent students while <50% signify non competent students. The mean marks for CLO1 achieved was also increased from 53% in Semester I 2017/2018 to 58% in Semester I 2018/2019 and to 66% in Semester II 2018/2019. These results proved that this innovation is effective in increasing the students’ understanding and comprehension on the course. Its effectiveness in addition to its low cost, easy access to the technology, ease in content development and is transferable to other courses are among the advantages of this innovation. Moreover, this innovation has the potential to be applied at the level of institution, making learning more enjoyable and pleasurable as well as producing students who are more competitive and able to make their own decision.

Acknowledgement

The author acknowledged the Center of Academic Planning, Development and Quality, UMT for all the support given.

References


A PROPRIETARY GAME-BASED LEARNING GAME FOR CHILDREN WITH AUTISM SPECTRUM DISORDER – LA FARMILIA

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Highlights:
La Farmilia is the online multiplayer computer game that is designed through cooperation between computer science professionals and game developers for autism spectrum disorder children to improve their social and daily life skill sets. Children with learning disabilities such as ASD usually have serious impairments with social interaction, communication skills and behaviour needing a high degree of personalization. This game contains immersive and customized game worlds with challenging and interesting daily tasks which reflect the consequences of decisions made by these children when overcoming in-game challenges and completing in-game daily tasks. The online multiplayer game is designed for them to improve their communication and living skillsets by interacting with immersive gameplay. Apart from the immersive gameplay environment, the unique mechanics of La Farmilia allows players of the game to be observed by recording their engagement and feedback during the in-game session. The data collected will be used as input for instructor or teacher to get more understanding about the respective children.

Keywords: Autism Spectrum Disorder (ASD), Game-based learning, Computer Game, Online Multiplayer Game, Learning Tools

Introduction
One of the major issues faced by autism spectrum disorder children is the lack of social communication skills. However, teaching communication skills to autism spectrum disorder children is challenging. Besides that, instructors and teachers need to use a different approach to find suitable methods to teach these children social communication skills. The proposed game is a 2D role-playing game named La Farmilia that assist autism spectrum disorder children to learn communication skills in an effective, customizable and interactive way. Children will play along the flow of the immersive game world and they easily will learn and pick up the required communication skills by interacting and completing the required tasks. A total of three Autism Spectrum Disorder learning centers participated in a pilot testing to evaluate the proposed game. Thus, the introduction of this role-playing game is necessary for autism spectrum disorder children to understand the communication skills and daily life skill sets. The existing teaching method and instructor learning centered approach are insufficient to support ASD children, especially learning communication skills. This is because the instructors or teachers are not able to monitor the children all the time. A game-based learning approach could be an efficient way for the ASD children to learn communication skills mainly because the empirical evidence that validates computer games as efficient tools for learning communication skills is still absent from the literature. Therefore the aim of this paper is to discuss the development of game-based learning game (2D role-playing) to learn communication skills for ASD children.
Content: Description of your innovation

The proposed computer game is developed according to the game-based learning design approach model, where several relevant theories such as conditions of learning, operant conditioning, constructive, hierarchy of needs and bloom taxonomy are included to ensure that the entire learning process is motivating and easy to learn. The game-based learning design model is divided to three layers, such as presentation layer, learning theory layer and core game-play layer. Each layer covers a different aspect, where the focus is on how to make the learning environment more effective for player to learn object-oriented programming. The proposed game is a role-playing game named La Familia that motivates users to learn object-oriented programming in an effective and interactive environment. Children will play along the flow of each game daily task and they will easily learn and pick up the communication skills. Children are not required to have any assessment exercises and learn via the provided game-play with hints and guidelines support. Three Autism Learning Center participated in a pilot test to evaluate the proposed game. The responses obtained from the centers showed positive results, where most instructors or teachers agreed that the proposed game is efficient as a learning tool to help ASD children improve their communication skills better. Thus, the introduction of this role-playing game for ASD children to learn communication skills is necessary. The La Familia implemented the concept of Role-Playing in the game to make it more exciting and engaging. La Familia is the first video game that can record player’s behavior and use pattern recognition. Professionals can then analyze recorded data. La Familia had also implemented the concept of Role-playing in the game to make it more engaging and more exciting for autistic individuals to play. Besides, all the game assets used are self-drawn 2-Dimension to give a sense of immersive learning. The player can perform all the in-game interaction by clicking on the respective icons, buttons and areas. Besides that, the provided user interfaces are designed based on the computer user interface design approach to make the player have easy-to-use interface while playing the game. Besides that, the hints associated with tasks have word quest appearing underneath the task icon.

La Familia is a role-playing farming simulation games, with online multiplayers that help to improve Autism Spectrum Disorder individuals to improve their social skills and daily life skill sets. To enhance the learning process based on autistic individual’s preference, this game possesses an attractive storyline with proper narrative contents, pleasant game environment, suitable sound effects and music and also cute animal character design. The story of La Familia is about a boy on a vacation with his parents. The parents decided bring him to visit his grandfather who lived on a farm. Upon arrival, he was asked to help his grandfather farm during the holidays. He was asked to rebuild and expand a long-neglected farm owned by his grandfather and required to take care of the farm before his grandfather leaves the town to travel around the world. The boy’s grandfather will guide him and teach him to farm before his grandfather leaves. He also required helping his grandfather to take care of the farm while his grandfather went on tour. His main objective is to refurbish and take care of the farm along the rebuilding process. La Familia also is a simulation game in which each player will play as a character himself and learn at his own time. The gaming part aims to improve autism individual’s social skills, and their responsibilities when they had been assigned with a task to do. Tasks are feature with short, straightforward and simple sentence for them to understand clearly since they tend to struggle with commands. Basically, player can do crafting, fishing and most importantly farming. They can trade their resources such as fish, crafted items and their crops with other players during the gameplay. Along the gameplay, the player may also interact with non-player characters (NPC) that inhabit the town, including engaging in friendships and bonding with these characters. The non-player character (NPC) will give different levels of tasks to the player based on player’s performance and players are required to complete the given level tasks. Besides that, a database features were implemented to the game to records certain player’s behavior. Their time spent on certain tasks, their activities during the gameplay and their pattern will be recorded. All the recorded data will be displayed in a data book and can be analyzed by professionals such as instructor, teachers and therapists. All the data will be converted to understandable words for professionals.

In order to ensure the learning outcome can be achieved via the gameplay and in game mechanics, it is necessary to align the learning design and game mechanics. The proposed game is adapts Biggs’ constructive alignment (Bigg’s, 1996) to align the gameplay with learning outcomes. There are two major ideas from constructive alignment from Bigg’s (Bigg’s, 1996) are shown below:

- how to get students engaged in learning activities that are likely to enable them to attain intended outcomes
- how to set up a learning environment that supports the learning activities

According to Prensky (2007), in order to achieve constructive alignment, the intended learning outcomes (observable behaviour, degree of attainment and conditions of attainment) should be aligned to structural elements (rule, goal and feedback) of games proposed. The tables below show the constructive alignment of the intended learning outcomes and game elements of the proposed game.
### Figure 1.0 In-game Farming Tasks

#### Table 1.0 Constructive Alignment 1

<table>
<thead>
<tr>
<th>Farming</th>
<th>Outcome of extraction and alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extracting components of Learning Outcome</td>
<td>Observable behavior: Understand the process of farming that required to follow procedures and timing...</td>
</tr>
<tr>
<td>Condition of attainment: ... that include farming seeds, selecting location, farming time, farming and harvesting methods ...</td>
<td></td>
</tr>
<tr>
<td>Degree of Attainment: ... to understand all the farming and harvesting procedure... with immersive simulation</td>
<td></td>
</tr>
<tr>
<td>Setting elements of game</td>
<td>Goal: Complete the interaction to plow the crop field. Complete the interaction to obtain seeds. Complete the interaction to repeatedly water the crop and refill the water can until fully grown. Complete the interaction to harvest the crop.</td>
</tr>
<tr>
<td>Rules of play: Farming can be divided into 4 phases. For phase 1, Player has to head to the tool rack and press the interact button to take the plow. Next, player will head to the crop field to plow the crop field in order to plant the crops. After that, player has to return the plow to the tool rack because tools cannot be stored in the player inventory. For phase 2, Player has two ways to obtain the seeds. The first one is buying seeds from the marketplace while the other way is to collect the seed by foraging. After that, player has to take the seed to the crop field where player has plowed and press the interact button to plant the seed into the field. For phase 3, when player sees a water notification icon pops up on top of the crop, player needs to go to the tool rack to take the water can. Then, proceed to the pond to refill water by pressing interact key. Next, player has to go the crop field to water the crop. Player can do that by standing one tile beside the targeted crop tile and press the interact key. Player needs to water the crop for multiple times (depends on the respective growth period), but the water can will ran out of water so player needs to repeatedly refill and water the crops until fully grown. For phase 4, when the crops are fully-grown, player can harvest the crops by pressing the interact key. The harvested crops will be stored in the player inventory. If inventory is not fully occupied, stores the fish/garbage into the inventory list. Otherwise, display the inventory UI and notify player that inventory is full. Hence, player has to free up 1 slot in the inventory to store the harvest crop by dragging the unwanted item into the trashcan icon (inside the inventory UI). If player wants to discard the newly item, do it the same way as discarding the already-stored items.</td>
<td></td>
</tr>
<tr>
<td>Feedback: Victory - show debrief that explains attainment Watering Crop On Time Success - The crop will successfully grown. Watering Crop On Time Fail - The crop will die and player cannot harvest it.</td>
<td></td>
</tr>
<tr>
<td>Alignment of Learning Outcome components &amp; game elements</td>
<td>Intended observable behavior that abide rules of play: Alerting and caring for the crops in order to harvest the crop. Fail in caring for the crops will cause player restart from planting phase and also waste the seed.</td>
</tr>
<tr>
<td>Victory debriefing: Harvesting crops can be successfully done based on the player alert and caring towards the crops.</td>
<td></td>
</tr>
</tbody>
</table>
What is the context or background of the innovation / product development / design / process?

Computer games are very common and popular all around the world, so do autism spectrum disorder children. Autism spectrum disorder children experience community engagement and social activities, but they are keen to have their strong interest in computer games. (Micah O.Mazurek, Christopher R. Engelhardt, 2015) There has been increasing interest in understanding potentially the effects of computer games in this population. Autism spectrum disorder children tend to have strong preferences for screen-based media, particularly computer online games. (Martin Sundberg, B.A., 2018) They also spend most of their time in playing computer games. (Micah O. Mazurek, Christopher R. Engelhardt, 2013). Most of autism spectrum disorder children favourite computer game genres are Role playing and Action Adventure. (Micah O. Mazurek, 2015) Around 31% of a autism spectrum disorder children prefer role playing games while action adventures are 19%. These two types of computer games genre have more than half percentage compared to other genres of video games. Boys autism spectrum disorder children who played role playing games had higher level of problematic game use and oppositional behavior. (Micah O. Mazurek, 2013). Serious games are also proven to support children with Autism Spectrum Disorder in the learning of different categories of vocabulary. (Kamran Khowaja, Siti Salwah Salim et al., 2018)

In computer games, non-player character (NPC) are needed so that players can interact with it. Non-player character (NPC) plays an important role in treating autism individual. There are a simulation that focused on the influence of personality on the triggering emotions and the influence of emotions on the dynamics social of the player. The used enriched model for non-player character (NPC) can improve player’s enjoyment and their feelings of immersion towards video games. (Magalie Ochs, Vincent Cornblu, et al., 2009). Besides that, design a non-player characters (NPC) are found to have more potential capabilities to increase their social competence. (Jewoong Moon, 2018) In the game Social Mirroring games, NPC are used most of the time to interact with players. This game has proven that it can be used as a tool to improve various aspects of social interactions of the autism individual by targeting mu rhythm modulation using neuro feedback. (Elisabeth V. C. Friedman, Aparajithan Sivanathan et al., 2015) When mention about social skills on autism spectrum disorder children, they tend to be very poor at this skill. Autism individual are prone to experience poor friendships and loneliness especially adults and adolescents. (Martin Sundberg, 2018) To improve autism social skills, video games can be part of the treatment to improve their communication skills. Online games such as role playing games, massively multiplayer online role-playing game have shown to promote their social skills and friendship in general populations. (Martin Sundberg, 2018) There are results show that children in the intervention group are more initiation to peers than other comparison group. (Debra Kamps, 2015) A multiple-baseline design are used to assess the effects of teaching typical peers strategies to communicate, as a result there’s a show of improvement in their conversational skills. (Linda M. Barbara, 2016) There are also results prove that peer network intervention shows growth in language and communication skills. (Debra Kamps, 2015). Video games have been found to improve children social interaction since they had increased their time in engaging with their peers by playing video games. (Lynn K. Koegel, Ty W. Vernon, 2012)

Game based learning is a term which combining education and also entertainment together which have the goals of learning something through the entire game. For example, from playing the family board game Monopoly, players will learn the financial management skills, which are really useful in the future while enjoying the game with other players. Game based learning is a more creative and useful way than normal education because it is a well known fact that learning by experience is more efficient than learning by studying. (Jayasinghe, U., & Dharmaratne, A., 2013) Game based learning vs. gamification from the higher education students perspectives. Proceedings of 2013 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE) Human do learn things from past no matter it is a bad or good experience for them. For an example, when the man fell down at Place A, he will be more careful next time when he goes through Place A to avoid been falling down again. Which show that human learning by experience is much more effective way than normal method. By game based learning, learning can come with fun instead of just keep staring at books or blackboard. There are new opportunities with game-based learning for reconsidering how we learn and for supporting the development of new immersive spaces where learners may produce their own materials, share learning experiences and practice skills for the ‘real-world’. (https://researchrepository.murdoch.edu.au/id/eprint/35774/1/gamimgreport_v3.pdf) After learners finish their game, they will share their gaming experience and also the thing that they learn in the game with other learners who play the same game. They will have a clearer understanding about the thing in the game itself after discussion among learners.

In order to create a video game for autism individual, many considerations have to be made and confirmed. Role-playing games will be a suitable video game genre to create for autism individual since majority of the autism player prefer role-playing games compared to other video games genre. They also prefer screen-based media, which particularly a video game. To make autism player to retain in playing video games, non-player character (NPC) plays an important role since it can improve player’s feeling of immersion, brings out the player's enjoyment and improve learner’s social competency. Using NPCs to give out quests or missions the players, implement simple vocabulary in a dialog and guide players when they difficulties can retain autism player to play. Multiplayer features can be
implemented to video games as a treatment to improve autism individual social skills. Player can communicate with
other players throughout the game, this can improve their communication skills and in the meantime, improve their
vocabulary.

Why are they important to education?

Objective:
To help individuals with Autism Spectrum Disorder to improve their social and communication skills effectively.
Serve as an alternative treatment for autistic individuals in a less stressful and more engaging way.
As the medium between Doctor and autistic individuals to better understand their current condition.

Value Added:
Developed according to game-based learning approach, where adequate learning content and autistic individual
preference is well structured with in-game mechanics.
Feedback, hints and guidelines are presented to the learner via appropriate narrative approaches.
The immersive simulation game worlds are provided to construct efficient learning experience for the learner.

Usefulness:
Record player behaviors using pattern recognition. Recorded data will be displayed in data book and can be
analyzed by professional
Suitable for autism spectrum disorder children to improve communication skills
Indirect practices in weaker aspects of autistic individuals (Social Communication, Intellectual, Organized Habits)

La Familia is the first computer game that is designed through a cooperation between computer science professionals
and game developers for ASD children to learn the importance of social communication skills that highly required for
their future This game contains immersive simulation game worlds with several challenging and interesting daily life
tasks which reflect the consequences of decisions made by the children when overcoming in-game challenges and
completing in-game daily life tasks. The unique mechanics of La Familia allows children who played the game can
improve communication skills via the game play with customizable game level setting.
La Familia can be played by ASD children aged between 7 and 16 years old to acquire knowledge and intellectual
skills related to communication skills and the importance of this communication skills as well as improving their
computational thinking. Instructor and teacher can use games as teaching and learning tools to help their children
to understand the learning content and the learning objective easily. The in-game challenges and daily life tasks can
be used to direct children to establish the required communication skills effectively. With the use of computer game,
less paper-based training materials would be needed, thus reducing the consumption of papers. Besides that, this
computer game also can reduce the electronic waste as well.

Commercial Value
La Familia will be published at Google Play Store and it can be downloaded for free. The full version will be published
at Google Play Store and Apply App store for USD0.99, in which it is distributed throughout the world. Players can play
the game on tablets or smartphones. In terms of marketing, the game will be featured in a game-based learning portal based in USA. A dedicated website is created to promote La Familia at https://bit.ly/2xKa7F. Besides that, promotion video had been uploaded to YouTube channel at https://youtu.be/fBmhEsTa_es.

Acknowledgement
This study has been supported by KDU University College, The National Autism Society of Malaysia (NASOM), ALRITE
Autism Service center and Adapt Enrichment Center. The researcher would like to extend gratitude to all the parties
that participated in this study

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THE AUGMENTED REALITY APPLICATION TO ENABLES CONCEPTUAL UNDERSTANDING OF MOSQUITO BREEDING AND RAISE DENGUE AWARENESS AMONG PRIMARY SCHOOL STUDENTS

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Highlights: Many of the tropical and subtropical regions of the world are facing a significant socioeconomic and disease burden from dengue infections. From the populations of Southeast Asia and Western Pacific regions, Asia has remains disproportionately affected by 75% of the dengue infection. Thus, it has become a major challenge to public health because of its widespread spread and dramatic increase particularly in Asia. Even though, action has been taken to combat the disease through media, campaign and other activities by the government and community, however incomplete knowledge of mosquito life cycle or breeding may result in less effective mosquito control measures. Taking advantage of augmented reality (AR) technology which is able to facilitate the visualization and integration of information by displaying it directly to the user, this study aims to educate school age children about the mosquito breeding. The study hypothesized that the use of AR application can assist students’ understanding of because it provides a dynamic visualization to support learning. Thus, able to create awareness in the early prevention of dengue disease.

Keywords: augmented reality, physiotherapy education, cardiovascular system, multimedia interactive development

Introduction

Many of the tropical and subtropical regions of the world are facing a significant socioeconomic and disease burden of dengue infections (Murray, Quarm, & Wilder-Smith, 2013). From the populations of Southeast Asia and Western Pacific regions, Asia has remains disproportionately affected by 75% of the dengue infection (Kularatne, Weerakoon, Munasinghe, Ralapanawa, & Pathirage, 2015). Thus, it has become a major challenge to public health in the affected region (Kularatne et al., 2015). The World Health Organisation (WHO) estimated that about 50 to 100 million of dengue infections occur worldwide every year (Artif et al., 2017). From these infections, almost half a million patients with dengue fever are hospitalized with 2.5% of them dying from the infection and many of them are children. Due to the significant geographic spread of the virus, dengue has been categorized as the most crucial mosquito-borne viral disease in the world (Kularatne et al., 2015). Even though, action has been taken to combat the diseases through media, campaign and other activities by the government and community, however incomplete knowledge of mosquito life cycle or breeding may result in less effective mosquito control measures (Lennon & Coombs, 2002). A study by Winch, Lloyd, Godast, & Kendall (1991), suggested that because of people ignorance about this knowledge made them do nothing to control dengue. An interesting study by Lennon & Coombs (2002), have revealed that school-age children understood that mosquitoes were in some way related to dengue. However information such as how to destroy mosquito eggs have been incorrectly assumed by the child that they could just step on them. Thus, it is crucial to educate people with proper knowledge on how to control the breeding of mosquitoes and preventing the disease from spreading earlier.

Taking advantage of augmented reality (AR) technology, which is able to facilitate the visualization and integration of information by displaying it directly to the user (Rodas, Barrera, & Padoy, 2017) this study aims to educate school age children about mosquito breeding. The study hypothesized that the use of AR application can assist students understanding because it provides a dynamic visualization to support learning. Thus, able to create awareness in the early prevention of dengue disease. AR is defined as a technology which allows virtual information to be overlaid onto user’s natural environment, thus enabling the user to view the information in real world (Alfaran & Marfin-maribo, 2018). As a learning tool, AR have been developing at a rapid pace, dramatically affecting public health education, cardiovascular system, multimedia interactivity and digital reality, phisiotherapy education, cardiovascular system, multimedia interactiveness, public health because of its worldwide spread and dramatic increase particularly in Asia. Therefore, this study demonstrates that...
the uses of AR has the potential to support conceptual knowledge essential in students’ understanding and visualization of phenomena that can increase collaboration and engagement among its users.

AR Design and Development

The following method for AR coloring development is proposed based on the work of Christ, Guevar, Poyade, & Rea (2018). There are three stages involved in the project development: data extraction, development of 3D models and integration of the 3D models into an interactive AR. Figure 2.1 illustrate the methodology flow used in this study.

First, as shown in Fig the data extraction starts with extracting the objects of interest from the actual image of the mosquito. Using the clip studio paint, the mosquito image is drawn and transformed into a 2D digital image which later is used as a reference in developing the 3D perspectives.

Next for the modelling, the process starts with building the 3D object by using low polygonal mesh in 3Ds max software. The outline drawing is then applied to the 3D object as texture. Next to coordinate the mapping which enables the outline drawing in 2D textures onto the surfaces of 3D objects, the UVW mapping is applied.

Lastly, the final 3D object with texturing is converted into fbx format before importing into 3D unity tools as the main asset for the AR Aedes coloring project. The AR is setup first, which Vuforia is used as third party application for the target marker. The user interface and buttons interaction were then designed for navigation.
The AR Aedes Coloring Interface

The following figures illustrate the prototype design of AR Aedes Coloring:

Figure 1.4: (a) AR setup process, (b) Input model into 3D unity tools and functionality

Figure 1.5: (a) Main interface, (b) Button navigation in AR Aedes coloring, (c) AR Aedes coloring with image tracker

The main interface consists of two buttons namely as Start and Quit. Pressing the start button will run the AR Aedes coloring application. There are eight main buttons in this AR interface, the Setting button consists of audio preferences. The Home button can navigate user to the main interface. The Start Capturing button, allowed the texture to be fitted into the 3D model area, once user have captured the image tracker with the desired colors, then the Save Region button will allows to save and set the texture from this colored image tracker to be applied onto the 3D model. As a result, user will be able to live view the 3D mosquito with the colors used on the image tracker. Meanwhile, the Fly button will activate the flying animation, whereas the Land button change from flying animation to landing movement. To control the mosquito movement, user can use the joystick symbol in the interface.

Conclusion

This study aims to explore the advantages of AR as an educational tool to assist student’s conceptual understanding about mosquito breeding. Therefore, it will be able to create awareness in the early prevention of dengue disease. The education about mosquito breeding as one of the vector control program is crucial in order to prevent dengue from spreading at the early phase. The research aims to design an effective AR application for knowledge transfer from the perspective of practice-based design; hence it will define a proper experimental set-up for the design issues and testing to enhance student’s conceptual understanding by immersing students in an augmented environment. Hence, this study will give an impact on student’s knowledge transfer about Aedes and dengue particularly to school community in Malaysia by using the advantages of AR technology. Therefore, this study will be a step forwards to an exploration of the AR benefit in experienced-learning approach application.

References


DEVELOPING AN ONLINE LEARNING MODULE USING SWAY, A WEB-BASED MICROSOFT OFFICE APPLICATION

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Highlights: Antibiotic resistance has been recognized as a major threat to global health, accelerated by the misuse and overuse of antibiotics. The lack of awareness about antimicrobial resistance has hampered effective prevention and control measures for this emerging threat to human health. This paper describes the design and development of an online learning module entitled “Antibiotic resistance: present scenario and challenges ahead” using Sway, a web-based Microsoft Office application. The module was conceptualized to raise awareness and to encourage active learning amongst medical and biomedical science students. The online learning module can be accessed using a university account through Office 365 (https://sway.office.com/s/rwHjzh6CBxuxV65/embed).

Keywords: online learning resources, design, Sway, web-based presentation, collaboration, antibiotic resistance

Introduction

E-learning platforms are increasingly being used to enhance teaching and learning in medical schools around the world. Sway is a web-based Microsoft Office application which combines text and media to create a presentation using a storytelling approach, in accordance with teaching needs and contents. Various multimedia elements from the used device, or from the internet can be included in the web presentation to support self-directed learning activities. The online learning resources can be viewed and shared amongst teachers for peer review and further collaboration.

Content

This paper describes the design and development of an online learning module using Sway application. The topic selected was on the present scenario and challenges posed by antibiotic resistance, a major concern in global health. The lack of awareness about antimicrobial resistance has hampered effective prevention and control measures for this emerging threat to human health. As strategies available to tackle antibiotic resistance are limited, the implementation of antibiotic stewardship programs and compliance with antibiotic guidelines and policies are important to ensure the appropriate use of antibiotics by healthcare professionals. In this study, an online learning module entitled “Antibiotic resistance: present scenario and challenges ahead” was conceptualized to raise awareness and to encourage active learning amongst medical and biomedical science students.

The online learning module developed in this study can be accessed using a university account through Office 365 (https://sway.office.com/s/rwHjzh6CBxuxV65/embed). The module begins by giving instructions on how to navigate the web presentation followed by the listing of four learning objectives. The module is divided into four sections (Figure 1), i.e., mechanisms of antibiotic resistance (section 1), causes and consequences of antibiotic resistance (section 2), strategies against antibiotic resistance (section 3) and introduction to antibiotic stewardship and antibiotic policies/guidelines (section 4). Each section ends with self-assessment activity followed by an explanation for the correct answers. A mix of multimedia elements (including images, videos, animation, and hyperlinks to specific websites) are included in each section to facilitate self-directed learning. The images and videos are inserted in the appropriate sections by dragging and dropping from a personal device or internet sources. Hyperlinks to recent publications and national/international antibiotic policies/guidelines are provided in the resources section. A simple glossary is provided to explain the terms used in the online learning module. At the end of the module, students are invited to reflect on their learning and to give comments through a questionnaire survey for further improvement of the module.

The online learning module developed in this study is learner-centered, and the teaching materials are organized in sections to promote effective teaching and learning. The navigation of the online learning module is easy and students are guided to go through text, images, videos and self-assessment activities. Most importantly, students enjoy the flexibility in terms of time and space, using mobile, iPad, laptop or personal computers to access the module. The online learning module can be shared through social networks and learning management systems. The choice of Sway greatly assists teachers with little training in web design and programming in developing online learning resources.
Figure 1: The online learning module (Antibiotic resistance: present scenario and challenges ahead) is divided into four sections, i.e., mechanisms of antibiotic resistance (section 1), causes and consequences of antibiotic resistance (section 2), strategies against antibiotic resistance (section 3) and introduction to antibiotic stewardship and antibiotic policies/guidelines (section 4). The online learning module can be accessed using a university account through Office 365 (https://sway.office.com/s/hwHjzh6CBxuxV65/embed).

Acknowledgement

The evaluation, feedbacks and comments given by Year I and II medical students, Faculty of Medicine, University of Malaya, are appreciated. Special thanks to Medical Education, Research and Development Unit, Faculty of Medicine, University of Malaya, and Dr. Lee Yew Kong for the assistance given in this study.

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Finga, John (1 October 2014), “Microsoft's Sway lets you share ideas on the web without any design skills”. Engadget, AOL.
EAR, NOSE, THROAT EXAMINATION MADE EASY – DUAL APPROACH

Highlights: This module titled: Ear. Nose, Throat (ENT) Examination Made Easy is created for medical students in pre-clinical and clinical years. The module is designed to be usable and navigated easily, so the student can get the intended learning outcome. The user has a dual approach to access this module. The first approach is on-line via MOOC (Open On Line Resource). The second is an off-line approach using an interactive CD. The materials in both approaches are designed according to the Clark and Mayer principles for designing e-learning materials. That made the learning process comprehensive and visual. The clinical examination techniques are explored step by step using multimedia prepared by the team.

Keywords: clinical --media-MOOC –Interactive CD –iterative.

Introduction
Competency in clinical examination method is a crucial learning outcome in all medical curricula. However, busy clinics, short allocated time for face to face training and patients’ safety issues compromise the students’ chances to master the clinical examination in ENT. On the other hand, the availability of smart-phones and computers among the majority of medical students offer an alternative platform for non face to face training.

Content
In this project, the dual approaches for learning ENT examination are MOOC and Interactive CD. The contents in both approaches are almost the same. However, a few modifications are needed to fit the contents to each technical approach.

The course is composed of seven syllabus which are ear, nose, oral cavity and oropharynx, Larynx, the face, and head neck. The themes are relevant and adequate in breadth and depth for undergraduate medical students. Each module starts by introducing the instruments, then techniques of examination and finally a self-assessment exercise. Many authentic videos are included in each episode to serve the needs of the students. Animations and texts are added to focus the message to the students.

In the MOOC approach, the course is conducted over 25 hours and is accessible equally to the students on-line. MOOC approach is chosen to conduct this course because of the easy accessibility of the internet in Malaysia as one of prominent countries of South East Asia with strong internet infrastructure. As smart-phones are almost in the hands of each student, this makes on-line education available equally at the tip fingers of every student.

The second approach is the interactive CD. The learner can navigate the CD to choose the targeted theme. As in MOOC, the learner can approach any subtheme. Within each module, the learner can navigate the topics of anatomy, clinical examination together with bonus gallery for related diseases. Eventually, the student can go to the quiz section for a self-test. The student can explore the learned theme in text and video forms. This course ENT examination made easy is crucial for medical education because it can be tailored to fit the needs of local students in both pre-clinical and clinical phases. The link to OER (Open Education Resources) enriches the platform, as the student can easily reach revised and remixed useful materials for free.

The main advantage of this MOOC approach towards education are its usability, heuristics quality and adaptability. The team made an effort to implement the general principles of interaction design by Nielsen (1995). That saves the learner time and consolidate the learned materials. In the other hand, the interactive CD has the advantage of working off-line. During testing of the MOOC course, the students found it user friendly, visible, easy to navigate, easily recognized, flexible and aesthetic. This course could be scaled down to fit small private online courses (SPOC) to enhance life long learning. This SPOC is suitable for health providers in districts. The iterative cycle model for evaluation this course will enhance its quality, which will positively impact the students’ competency in ENT examination (figure 2). The direct profitability of this course will be achieved by reducing the cost of regular teaching and learning. Less face to face teaching learning will give the lecturers more time in clinical service or conducting research. On the
other hand, MOOC course could attract more students to join faculty of medicine and health sciences. The interactive CD, could be marketed well in the countries with poor internet infrastructure.


Figure 1- Aligning the contents of MOOC module

Figure 2- Iterative cycle to ensure quality of MOOC course

Aknowledgement

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We are so grateful for faculty dean Prof. Dr. Mohamed Saffree and deputy(s) dean for supporting the project. Thanks extended to Prof Fong and AP Dr. Kenneth and team for technical support.

References


HPV GAME: ALLEVIATES VACCINE HESITANCY AMONG HIGH SCHOOL STUDENTS THROUGH EDUTAINMENT GAMING

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Introduction: Cervical cancer ranks as the third most common cancer among women in Malaysia. Therefore, there is a great need to increase the prevention of the disease through HPV (Human Papillomavirus) vaccination among adolescents. However, the Malaysian Ministry of Health encounter vaccine hesitancy issues among Malaysian youths. The possible factors for reduced vaccine uptakes among high school students were due to lack of awareness and vaccine hesitancy.

Objective: This study aims to alleviate vaccine hesitancy among high school student by creating awareness towards cervical cancer, and to promote the HPV vaccines uptake among high school students by using edutainment gaming known as “HPV Game”.

Materials and Methods: This game targeted high school students from 10 to 17 years of age. The players were expected to finish all 3 levels and able to answer all 15 questions. Our target players were Malaysian citizens, possess personal computers (PC) with connectivity to the game. We exclude those with physical disabilities.

Results: “HPV game” was the first edutainment on Human Papilloma Virus, cervical cancer, and HPV vaccine. This game enables players to think critically of the best answer to protect themselves against the obstacles in the game. This game fills the gap between formal lectures and socio-cultural myths on HPV vaccination.

Conclusion: Preventing cervical cancer by promoting HPV vaccines uptakes by using a forward technology such as a serious game for health most probably will enhance the target clients’ adherence to HPV vaccination and increased awareness. Therefore, for precisely tested the benefit of HPV vaccine game, conducting an observational study to assess players’ perspective among teenagers is highly recommended.

Keywords: HPV, Vaccine, Serious Game, Teenagers, Health Game.

Introduction

Human papillomavirus (HPV) vaccine is a vaccine that prevents infection by certain types of human papillomavirus. Available vaccines protect against either two, four, or nine types of HPV. All vaccines protect against at least HPV type 16 and 18 that cause the greatest risk of cervical cancer. Cervical cancer ranking as the second most common cancer among women in Malaysia so there is a great need to increase the prevention of the disease through vaccination and regular screening. However, according to the 2006 National Health and Morbidity Survey, only 47.3% of eligible women have ever had one.

In this paper, we focus to alleviate vaccine hesitancy among high school student by creating awareness towards cervical cancer, and to promote the HPV vaccines uptake high school students by using edutainment gaming known as “HPV Game”.

Content

“HPV Game” is a serious game for health particularly designed for high school students to enhanced knowledge about Human Papillomavirus, create awareness regarding cervical cancer and promote practices towards HPV vaccination.

“HPV Game” was initiated by a lecturer from Universiti Malaysia of Pahang (UMP) in collaboration with a public health physician from Malaysia Ministry of Health. The first prototype was employed with Unity and optimized by professional game developers. During the development, firstly, we chose the background of the game, correct resolution, Then we set up the virus image using the coding script in C++ by MonoDevelop.
“HPV Game” has 3 levels where each level has five questions. At the first level, the question arose in relation to the transfer of knowledge on Human Papillomavirus (HPV), at the second level there is a question about awareness of cervical cancer and the last stage has questions regarding the perspective of the HPV vaccine. Table 1 shown describes the “HPV Vaccine Game” elements further.

Table 1: HPV Game elements

<table>
<thead>
<tr>
<th>Game element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Players will receive scores and rewards if they managed to pass every questions and stage in the game. The rewards will be in term of score point and time duration.</td>
</tr>
<tr>
<td>Players</td>
<td>This game is designed for the individual player. The players only interact with the game content.</td>
</tr>
<tr>
<td>Abstracts</td>
<td>Games involve abstraction of reality and typically take place in a game space. The genes reflect on Malaysia setting with various cultures and beliefs.</td>
</tr>
<tr>
<td>Challenge</td>
<td>The game is designed to have different challenges at every stage and has a different difficulty level.</td>
</tr>
<tr>
<td>Rules</td>
<td>Age restriction, demographic information is required before play the game, playing the game in order (cannot skip), the player cannot interact with other neighbors.</td>
</tr>
<tr>
<td>Interactivity</td>
<td>The players interact with the game system and the game environment.</td>
</tr>
<tr>
<td>Feedback</td>
<td>To complete each stage, the question appeared on the screen and the feedback from the player is required.</td>
</tr>
<tr>
<td>Quantifiable Outcome</td>
<td>There was a typical scoring system and the players need to pass certain scores to go to the next level.</td>
</tr>
<tr>
<td>Emotional Reaction</td>
<td>The game involves emotions such as fear, anger, and happiness, and enjoyable upon each level.</td>
</tr>
</tbody>
</table>

“HPV Game” was targeted for high school students from 13 to 17 years of age. The inclusion criteria were Malaysian citizen, possess computer (PC) with connectivity to the game. We exclude those with physical disabilities (i.e., blindness, or limitation to hands movement). “HPV Game” is important to education as it may serve as tools to alleviate vaccine hesitancy among high school students. This edutainment gaming enables students to enhanced knowledge about Human Papillomavirus, create awareness regarding cervical cancer, and promote practices towards HPV vaccination.

“HPV Game” specially designed for high school students to ensure knowledge transmission about Human Papilloma Virus (HPV), to create awareness towards cervical cancer, and to promote the HPV vaccines uptakes among teenagers. The novelty of this HPV game is cost-effective, free PC games and become the first HPV game in Malaysia. “HPV Game” was the first edutainment on Human Papilloma Virus, cervical cancer, and HPV vaccines. Players are able to collect life in order to survive to achieve a certain level in the game. This game enables players to critically think of the best answer to protect themselves against the obstacles in the game. This game fills the gap between formal lectures and socio-cultural myths on HPV vaccination. Currently, this HPV game still under consideration for copyright application and we believe that health games give a potential effect among teenagers where the game becomes an important medium to improve behavioral health towards a healthy lifestyle, increase disease’s awareness and promotes the choices of healthcare services provided by the Ministry of Health and other health facilities.

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References


LEARNING JAWI ALPHABETS USING MOBILE AR APPS

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Introduction
Nowadays, Jawi script is rarely used in daily life. However, it is still very essential for school children in Malaysia to know how to read and write using Jawi script in order to learn Pendidikan Islam, a compulsory subject in primary school.

Amazing Jawi AR is a mobile application software that will assist the user learn Jawi alphabets, learn the correct pronunciation of each alphabet and learn how to combine each alphabet to form the correct Jawi script. Currently, the app is in Bahasa Malaysia and caters for Android users only.

Amazing Jawi AR enhances the learning experience by using multimedia elements and augmented reality in the modules. In order to attract children learning Jawi, the element of gamification and augmented reality is also included.

This application will help users improve their learnability of Jawi alphabets. This project is developed using Rapid Application Development which is system prototyping. Amazing Jawi AR can be used as a teaching tool in the class as well as at home with the assistance of their parents.

Keywords: Jawi alphabets, augmented reality, gamification.

Motivation
Jawi is an art of writing that originates from the Arabic writing in which Arabic letters are infused into Malay writing system. Jawi scripts is one of the world’s oldest scripting language. Until now, Jawi is one of the two important and official scripts in Brunei Darussalam and used as an alternative script in Malaysia. It used to be official standard writing for Malay language since the 14th century but has since been replaced by Latin alphabet, called Rumi (Roman) when the implementation of the National Language Acts 1963 in Malaysia. Eventually, Jawi has since been relegated to script used for Islamic religious, cultural and administrative purposes only. Jawi is getting unrecognized by the younger generations when Jawi skills used to be the official writing script for the Malay language among our people (A. Mamat, R. Kamis and A. Abdul Rashid, 2012). Jawi skills are important as it is required when reading Qur’an, learning Arabic languages and other Islamic subjects. Hence, children have to master Jawi skills.

In today’s society, technology has become a crucial part of our lives, one of the newest developing technologies is augmented reality (AR) which can be applied to computers, tablets and smartphones. AR affords the ability to overlay images, text, video and audio components onto existing images or space. There are many applications been developed in order to improve educational learning that applies AR functions that used to attract younger generation.

Augmented reality has the potential to improve the new method of education medium include Jawi. Therefore, augmented reality allow educators to “reconceptualize” of how they view learning and “rethink” what they should teach (Collins and Halverston, 2009) by engaging technology to view aspects of the real world in different way.

Objectives
1. To develop android based mobile application consisting of gamification-based module of Jawi
2. To implement augmented reality that display AR of Jawi alphabets
3. To test the user acceptance of the mobile educational jawi learning application

Overview of the Mobile AR Application
Figure 1 below shows the overview of AR Jawi application contents.
Figure 1: Overview of the mobile application of AR Jawi learning

Value Added
The uniqueness of this product is the implementation of two interesting elements: gamification and interactivity. Gamification element aims at increasing the engagement and motivation of students, capturing their interest to continue learning. Interactivity is also important in order to attract students to learn basic Jawi on Mobile phone.

Commercialization Potential
AJAR – Amazing Jawi AR, could be used as an alternative learning tool in the pre-school to learn basic Jawi alphabets. AJAR mobile apps could assist children in the early age to be exposed to Jawi alphabets. It also can help in the mastery of the subject and motivate others to learn more about Jawi alphabets where it is useful for further Arabic studies in Islamic studies affecting their daily life. It also can be used by anyone who wants to learn Jawi alphabets by downloading it from the Google Playstore.

References
A GAMIFICATION-BASED BLENDED LEARNING SYSTEM FOR A COMPUTER SECURITY COURSE: EXTENDING EXPERIENTIAL LEARNING

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Highlights: In many cases undergraduates are driven by assessments and achievements rather than the journey of learning; that can be attained through full engagement with provided material. Innovative approaches are needed to improve engagement within and outside of a classroom or laboratory setting, and to achieve a greater depth of learning. This paper discusses a system that uses gamification with blended learning, to learn social engineering skills as part of a computer security course in higher education, to extend experiential learning.

Keywords: gamification, blended learning, experiential learning, computer security, social engineering, higher education.

Introduction
This paper describes a gamification-based blended learning system that students utilize to learn social engineering skills; an important topic in a year-two computer security course; Ethical Hacking and Countermeasures (EHCM). The conventional teaching approach is a two-hour lecture followed by a two-hour tutorial; within the same week. Activities for the tutorial include case studies discussions, viewing videos and/or conducting role-playing in the classroom. These activities provide some level of engagement and interaction; but provide very limited time and experience for a student to acquire basic social engineering skills; skills that are best obtained through experiential learning. To allow students the time to understand, develop and learn social engineering skills, this topic was incorporated into the coursework component; assessed within a 6-week time frame; beginning in week 5 of a 12-week semester. To extend experiential learning, and face-to-face discussion with the instructor; the Openlearning learning management system (LMS) is used; along with two online gamification software linked to the LMS. Openlearning is the platform subscribed to by the university college.

A pilot test of the system is currently being implemented on students enrolled in the EHCM course. Data on the students’ initial motivation to learn social engineering skills, prior to using the system, and their motivation to learn after using the system will be collected from a qualitative and quantitative pilot questionnaire. It is anticipated that the knowledge generated from this pilot study would offer new insights into gamification-based blended learning for computer security education, and so inform higher education practice with regard to extending experiential learning. This research will employ a mixed methodology with sequential analysis. The mixed method approach allows the researchers to actively participate with the students. The analysis and mix of qualitative and quantitative data in a single study or series of studies, allows the researchers to understand the problem better (Creswell & Clark, 2007); and achieve complementarity of data (Greene et al. 1989).

System Design
The system is a blended-learning game ‘played’ over a 6-week time frame. The goal: complete five missions. Students attempt one mission per week; and given a week to solve their missions. There are three levels of missions based on difficulty: easy, medium and hard. The more difficult the level, the more points are awarded. Bonus points are awarded for description quality, and for including mission evidence. The gamification-based online components used are:

- Openlearning’s discussion board and announcement features for students to post mission results and for the instructor to moderate, comment and award points for the results.
- Squiffy by textadventure.co.uk to create mission levels and questions.
- KeepTheScore to create scoreboard.
Figure 1 illustrates the design of activities for the Social Engineering Missions Game, based on a similar model as prescribed by Tan and Hew (2016):

Face-to-face instruction is integral to the system; students need feedback and assistance from the instructor and peers, so they can perform better on their next mission. Students can share their missions with other students, or decide not to. Students who share their missions must also share the points awarded. The top three students with the most points are announced in class at the end of the ‘game’. Table 1 shows the implementation of the blended learning Social Engineering Missions Game activity:

Table 1: Implementation of the Blended Learning Social Engineering Missions Game

<table>
<thead>
<tr>
<th>Week within 12-week Semester</th>
<th>Face-to-face Activity</th>
<th>Online Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 5</td>
<td>Administer pilot questionnaire&lt;br&gt;Classroom learning: lecture and tutorial on social engineering&lt;br&gt;Introduce the mission game-play. Game starts in Week 6</td>
<td>Access class materials (if required)</td>
</tr>
<tr>
<td>Week 6</td>
<td>Students consult instructor if there are any doubts about their mission&lt;br&gt;Student attempts to solve mission</td>
<td>Students select their first mission (level and mission number)&lt;br&gt;Student attempts to solve mission and posts attempt description&lt;br&gt;Instructor moderates, evaluates and awards points&lt;br&gt;Instructor creates and posts scoreboard&lt;br&gt;Students view scoreboard</td>
</tr>
<tr>
<td>Weeks 7 - 10</td>
<td>Students consult instructor if there are any doubts about their mission&lt;br&gt;Student attempts to solve mission</td>
<td>Students select their next mission (level and mission number)&lt;br&gt;Student attempts to solve mission and posts attempt description</td>
</tr>
</tbody>
</table>
Contextual Background

The major challenge with teaching a computer security course is selecting topics from among many important and interesting possibilities (Yurick and Doss, 2001). In the context of this study, there is no prescribed technique to teach social engineering skills to students. However, to teach the skills within a classroom-only environment in a short time frame is insufficient for students to attain an acceptable level of social engineering skills. From past experience too, some students are very reliant on the instructor’s guidance and have problems in integrating theories with practice. Hadnagy (2010) explains that social engineering is the art and science of skillfully manoeuvring people to take action in some aspect of their lives. Hadnagy (2010) further asserts that these skills are the ability to gather information, use elicitation and pretexting techniques, and the ability to influence others. Hadnagy (2010) also concludes that these individual skills are not just any one action but a collection of the skills mentioned.

A blended learning approach is able to address the challenges described above. Blended learning is “combining face-to-face instruction with computer-mediated instruction” (Graham, 2006). Graham (2006) further suggests that blended learning can be applied at many different levels: activity-level, course-level and program level. This system applies blended learning at activity-level. With blended learning, interactions between the instructor and students are more effective, time efficiency is improved and students have autonomy in their learning.

Gamification is the use of game elements in a non-game context to increase engagement. Incorporating gamification-based elements into blended learning provides an alternative means for instructors to engage students during the teaching and learning process (de Sousa et al., 2014). Gamification gives instructors game-like tools to motivate and reward students to give their full selves to learning (Kiesler et al., 2011). Bunchball (2010) explains the gamification-based elements; known as game mechanics, as the use of points, badges, levels, challenges, virtual goods, and leader boards. Bunchball (2010) further asserts that these game mechanics correspond to a variety of human desires such as the need for reward, status, achievement, self-expression, competition, and altruism.

Experiential learning theory, or ELT, is active learning where the learning is any student-centered activity (Banfield and Wilkerson, 2014). Banfield and Wilkerson (2014) further asserts that gamification is an offshoot of ELT; the combination of game mechanics such as score, challenge, and achievement with learning objectives in an effort to motivate and engage the student. Banfield and Wilkerson’s (2014) study further explains that competition, either against one’s self or against a peer group is the driving force behind the success of gamification.

While there is still a debate on the importance of experiential learning in content development, the concept becomes effective if it is applied appropriately. We believe that this pilot system’s effectiveness is directly related to a sound understanding of the theory supporting the learning.

System Advantages

The expected advantages of the system are based on Kolb’s (2005) experiential learning cycle; as listed below:

Concrete Experience (doing) – the student is involved in a task (missions) and in a relationship (the act of social engineering itself, and sharing missions).
Reflection – the student uses open reflection (online and face-to-face discussion), a dialogue for sharing the perception and how he/she interacted (how the missions were solved). The student evaluates the facilitated and not facilitated processes done (students provide feedback and opinions to instructor and peers).
Interpretation – the student develops a common culture (the social engineering skills) through building the shared significance of the events (the missions).
Planning – the student is engaged in planning, solution, and expression of an action (solving the missions).

System Marketability

The system is currently not a fully integrated one; it uses free online gamification tools which are not a plugin or a built-in feature in Openlearning. Two main options to consider as future development for the system and to make it more marketable exists:

Use an Open Source LMS platform with built-in gamification-based functions, or allows the modification/creation of new ones. The suggested LMS would be Moodle.

Design, develop and implement a standalone web-based system.

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References
TRANSFORMATIVE TEACHING: IMMERSIVE STUDENTS’ LEARNING WITH WEB 2.0 ADAPTATION IN MICROBIOLOGY©

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ABSTRACT
The emergence of various media-based learning used in teaching and learning is aided greatly by advanced technology. The use of technology has come a long way, where students achieving competence are interested in interactive visual learning. On the other hand, effective tools of teaching and learning are rapidly changing, and have become part of a comprehensive system for lifelong education. Education industry has moved from distance learning to e-learning, as knowledge had expanded exponentially and the demand escalated. Therefore, self-directed learning by adapting and developing contents using web 2.0 during learning processes are lifelong, thus creating more conducive environment for students.

Keywords: adaptation, free-media based, immersive, conducive, heutagogy

INTRODUCTION
The rapid development of technology has influenced education systems which is seen from the emergence of various media-based learning used in teaching and learning processes. Therefore, opportunities and spaces need to be utilized as much as possible by educators in realizing that the process of teaching and learning can be implemented more effectively in line with the aspirations of the nation’s education philosophy.

On the other hand, the tendency of university-level students using gadgets in unlimited social media can be channeled towards the usage of better and profitable way. Therefore, self-directed learning by adapting and developing contents using web 2.0 during learning processes are lifelong, thus creating more conducive environment for students.

The application of free media-based learning system will help students to explore the subject matter and apply the knowledge in the classroom and shared with others. Students were given an opportunity, thus guided to create contents and questions based on group’s discussions, ability and creativity, in line with the desire to make the learning process more effective, conducive and interesting. Statistical analysis before and after the implementation of these techniques have been conducted where communication, technical, psychomotor, scientific approach and lifelong increased by balancing between embracing new methods of teaching and learning without forgetting on the timeless principles of education.. “We listen, we forget, we do we remember”.

Description
This self-directed learning process (heutagogy) gave students opportunities to create contents based on group’s discussions, ability and creativity, in line with the desire to make learning processes more effective and conducive. The contents later presented by each group, thus discussions, comments and recommendation takes place before being shared.

Context
In this system, the emphasis is on applying knowledge and information effectively among students in this era of sophisticated technology and complexity. Our first challenge is how to attract students’ interest to the subject that will be taught is important to enable all involvement throughout the learning and teaching process to occur. The introduction and an overview of the entire subject is an important phrase for building an educated interest to stay engaged with the topics to be taught. The diversity of students in each study session is a major challenge that needs to be addressed so that the equality of guidance can be addressed. Therefore, an alternative immersive teaching method ‘TRANSFORMATIVE TEACHING: IMMERSIVE STUDENTS’ LEARNING WITH WEB 2.0 ADAPTATION IN MICROBIOLOGY©, is proposed as the most appropriate learning system for the current generation.

Importance to education
According to Duke (1990), education is a practice of artistic action where learning process of learning is considered as design and knowledge is considered as a color. Teaching and learning processes should be flexible in turn giving students the opportunity to think critically and learn things based on their curiosity and interests. Therefore, teachers need to use various strategies to make the learning experience interesting. Moreover, the learning environment should promote the diversity and positive learning environment. Teachers also need to help shape the transformation and
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exchange of learning styles (Jarvis, Holford & Griffin, 2003). Undoubtedly, teaching requires innovation and flexibility to address different circumstances and it is not governed by the established rules (Bastable, 2005).

In the meantime, teaching philosophy also need to be understood from a multidimensional perspective; as a teacher as well as a student. At the end, it encourages a conducive learning environment. The process of teaching and learning in the 21st century is very challenging with the rapid development of technology encompassing the diversity of learning tools and its applications. The exposure to ongoing technology since childhood leads to an over-exploitative used, thus without any doubt, the tendency of university-level students using gadgets in unlimited social media, can be channelled towards the usage of better and profitable way. Therefore, self-directed learning by adapting and developing contents using web 2.0 during learning processes are lifelong, thus creating more conducive environment for students.

The application of free media-based learning systems will help the students to master the subject and apply the knowledge in the classroom and shared with others. Students will be given the opportunity and guided to create topic contents and questions pack based on their group’s discussions, ability and creativity, in line with the desire to make the learning method more effective and interesting.

Advantages towards education and community

The video notes created and produced by the students were uploaded therefore the students do not have to carry heavy paper notes every time if they have any on campus activities or even returning to their respective homes. Therefore, the learning process can take place anywhere, anytime, everywhere. All of these video records had obtained ‘copyrighted rights’ from the Intellectual Property Corporation of Malaysia: series no LY2019000712 to protect the contents of the video. Contents were posted previously on lecturer’s platform at openlearning.com which were later burned onto CDs. The contents not only can be retrieved and shared amongst other students within the university but also with other local and international universities whom students enrolled a similar course.

Commercial value

Previously, the teaching and learning process of the students was only conducted in lectures and alternate quizzes. However in the first semester of 2018/2019 from lecturer’s observation, it showed that, the tendency of gen Z students more attracted on visual compared to ‘classical’ lectures. So, based on the students’ evaluation on e-spp, hence, a slight change is designed to seek more effective teaching and learning alternatives and encompasses the involvement of all. This learning and teaching innovation can be applied to other subjects.

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References

GVSCAPES: MOBILISING THE SCAVENGER HUNT FOR ENGLISH LANGUAGE LEARNING

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Highlights: This research had developed a GVScapes mobile application which integrated android-based application to assist the teaching and learning activities in University Malaysia Sabah (UMS). The gamification element is injected inside the classroom by utilising a creative approach to the existing conventional scavenger hunt game. The implementation of an android application with AR capability allows the students to play educational quizzes. The two-fold objectives of this project included: (1) developing an android-based fun quiz application with AR technology which was location-based so students could experience interactive learning environment; and (2) investigating the implementation of this mobile application during English lessons using the iterative methodology.

Keywords: English language learning, location-based augmented reality, gamification

Introduction

English courses are made compulsory for students in UMS. Despite the years spent to learn the language in schools, some students appear to struggle when communicating in English. Various interventions such as English Language Flagship programme, ‘Say it in English’ campaign and English Carnivals are carried out to provide the platforms for UMS students to use the language. The issue in English language teaching here is akin to the information/input that students are able to retain and apply for their English grammar and vocabulary enrichment. In view of this, GVScapes is developed to provide solutions to assist teaching and learning activities.

Description of innovation

GVScapes is an Android based mobile application which has mobilised the scavenger hunt learning activity using the Augmented Reality (AR) technology that included the: (1) 3D-animation; and (2) location-based GPS. These functions would allow the user to play educational quizzes using the built-in camera via their mobile phones. GVScapes has the added graphic or image in the specific locations consisting of the existing natural environment for users to experience a new and improved world via the virtual information. It was developed as an alternative or to complement the existing conventional teaching and learning activities. The target users for this application are UMS lecturers and students because the locations in GVScapes are comprised of several locations in UMS. They could use their smartphones with the Android-based operating system. This android based mobile application were developed using C# and JavaScript in Unity software. The objects in GVScapes were created using the Unity software. While, the method for the maps to locate the hints using the AR location-based and features were anchored on real-time location, GVScapes is free and can be used anywhere using the Android based operation system.

The context or background of the innovation

Scholars have discovered that active learning techniques can improve students’ retention and understanding of the course materials, such as problem-solving exercises and case studies techniques (Carr, Palmer, and Hagel, 2015; Myers and Jones, 1993; Prince, 2004; Scott et al., 2009). The active learning techniques are, usually, focused on the application of information in which the students are equipped with knowledge and the skills needed. Thus, this project endeavoured to promote active learning advocated by the aforementioned scholars by injecting a creative and innovated approach to the conventional and well-known Scavenger Hunt activity. In the case of this project, the conventional Scavenger Hunt is mobilised via gamification to promote active, meaningful and interactive learning for topics related to English grammar and vocabulary.

The Importance of GVScapes to education

GVScapes is an educational app for students to learn English grammar and vocabulary using their mobile phones. It allows the student to physically roam five locations in UMS by utilising their mobile devices’ capabilities. In addition, the students are required to answer a list of questions or solve the problems provided in the apps which allow them to practise information seeking skills. GVScapes can be an educational and fun experience for all English language learners regardless of their age groups and levels of proficiency. In addition, GVScapes provides more than repetitive
memorisation as well as to allow more students’ engagements in their learning experience when a game or competition is involved. Therefore, GVScapes could assist UMS students’ English grammar and vocabulary learning using their smartphones.

The advantages of GVScapes towards education and community.

Upon the testing of GVScapes, it was found that students appeared to enjoy learning grammar due to these reasons:

- provided more autonomy for the students to navigate their own learning pace
- students were not confined in classroom settings as they were mobilized around UMS campus (e.g. PPIB, UMS clock tower, UMS library, PKI and Chancellor Hall)
- students were also exposed to problem-based learning where they needed to find the solutions to their problems (e.g. means of transport to reach different locations, deciphering the answers to the quizzes)
- injected the element of technology-enabled learning in a conventional teaching of grammar and vocabulary (e.g. learning the English grammar and vocabulary through digital and interactive animations).
- students learned grammar and vocabulary in context which was in line with the course learning outcomes and teaching approach (i.e communicative language teaching)

The commercial value in terms of marketability or profitability of GVScapes. GVScapes can be most likely benefitted by these institutions and company:

- Malaysia Ministry of Education
- Universiti Malaysia Sabah
- Malaysia Ministry of Higher Education
- Google Play

References


LEARNING DUSUN LANGUAGE FLASHCARD WITH MOBILE AR APPS

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Introduction
Dusun language is one of the languages of the indigenous people in Sabah, Malaysia. It is used in daily interactions
and conversations among the Dusun community. However, the language was classified as an endangered language
as reported by UNESCO in 2005. The language is merely spoken by 300,000 people and in the real threat of extinction.
In addition to that, it appears that the speakers of the language are mostly in the above fifty-year-old category.

Realizing the benefits, an educational Dusun language learning mobile application is developed to help
learners to enhance their level of knowledge in learning the language. The content of the apps covers basic Dusun
vocabularies and simple conversation suitable for learners who are just starting to learn the language. This is an effort
to add more online resources for learning the language and to help in preserving the language usage among the
younger generation of the Dusun.

To develop the system, all required information is gathered from Dusun language speakers, books, and doing
literature review of existing online system. The methodology used in this apps development is the iterative method
which consists of requirement analysis, system design, implementation and coding as well as testing and evaluation
phase. In conclusion, the apps can be used to support the teaching and learning of the language in class and also
can be used directly by users’ who are interested to learn the language.

Keywords: Dusun language, augmented reality, mobile apps.

Motivation
Nowadays, Dusun language is slowly becoming extinct among the younger generation. Dusun people can be
found working as professionals in various fields all over the world; but less than half of them speak their native language
with 75% of them are above 45 years old, less than 5% of those who under 25 years old can speak their language
(Herman, 2006). This shows that the community is in danger of losing its mother tongue as the younger generations
were practising less of the language.

Furthermore, the Dusun language also is taught in schools, and in universities. The total number of pupils taking
up the language in schools is 55,566 from 384 primary schools involving 1,100 teachers and 4,416 students’ taking the
subject in 45 secondary school which involved 94 teachers (Tangau, 2018). However, there are less learning tools for
the language, thus the learners may have problems to learn as there are not many references and resources in
learning the language. Most of the online learning tools for Dusun language provide very limited features in their
learning tools.

Augmented reality (AR) is an interactive experience of a real-world environment. It is a variation of the virtual
reality technology where it helps users to interact with the virtual object in real-time situation. An animated content
during lessons will catch learner’s attention and motivate them to learn. Augmented reality has the potential to
improve the new method of learning a language.

Objectives
1. To develop an interactive augmented reality learning Dusun language mobile application.
2. To implement augmented reality in learning Dusun language.
3. To test and evaluate the usability of the learning Dusun language mobile application development.

Scope of the Dusun Mobile AR Apps
The app is developed and designed for people who want to learn Dusun language. The scope of the project
includes:

i. Learning Module
   In this module, user will be experiencing augmented reality technology. The visualized image can be
   scalable, rotate and move around.

ii. Simple Conversation Module
   This module provides simple conversation while displaying the Dusun word
iii. **Assessment Module**  
Quiz is set randomly from the learning modules.

iv. **Culture Module**  
This module contains some information about the Dusun culture.

**Value Added**  
Interactivity is one of the important factors in order to attract students to learn basic Dusun language on Mobile phone. AR and multimedia element are added to increase the motivation of student in order to learn the language. These elements may capture learners’ interest and attention to continue learning.

**Commercialization Potential**  
The learning Dusun mobile apps can be used as an alternative learning tool in schools and also can be used by anyone who wants to learn basic Dusun language.

**References**

MODEL OF BEHAVIOUR INTENTION FACTORS ON SOCIAL MEDIA USE FOR COLLABORATIVE LEARNING

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Highlights: Despite technologies of social media gaining acceptance in universities all around the world, the study on factors of students' behavioural intention to use social media for collaborative learning have not been fully explored in Malaysia and useful insights are still needed to resolve this problem. Thus, this project examined influential factors on students' behavioural intention to use social media for active collaborative learning that affects teaching and learning. This study developed a theoretical model based on Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use Technology (UTAUT), and constructivism theory. The findings of the study revealed that perceived ease of use, perceived usefulness, perceived enjoyment, performance expectancy, social influence, and facilitating conditions are positively related to students' behavioural intention toward the use of social media for collaborative learning purpose. Based on the study, the use of social media is significant and positive for collaborative learning and teaching in Malaysian Higher Education institutions.

Keywords: Collaborative Learning, Teaching and Learning, Social Media, Behaviour Intention.

Introduction

Social media development is sparked by a steadfast progression of Internet application. Communication and interaction through online and offline means have changed due to the advent of social media. Various reasons are accounted for its daily usage in general among a huge number of individuals especially among younger crowd worldwide. Most of the younger crowd who uses social media are students. The means of information creation and sharing across the web among students with their friends have changed attributed to social media emergence (Shittu et al., 2011). Technology application in supplementing teaching and learning in classroom is also affected by this revolution. Technology emergence including Web 2.0 and social media are essentially helpful in enhancing higher education teaching and learning, with its enriched features (Hartshorne and Ajjan, 2009).

Social media’s positive influence on students, where it was utilized for educational purpose is evident in past research works (Bicen and Uzunbeylu, 2013; Kamnetz, 2011; Kabilan et al., 2010). Teaching and learning activities using enriched features of social media have been exploited by various educational institutions (Tinmaz, 2012) and utilized in refining communication to faculty members and students through adopting this technology for improved services (Al-Mukaini et al., 2014). This is on the grounds that significant educational potential is held in the technology of social media that could bolster the activities in education by enabling collaboration, interaction, critical thinking, active participation, and information and resource sharing (Mazman and Usuel, 2010).

As students give rise to social media popularity, the literature of higher education has mainly discussed social media usage among students and lecturers in educational setting, and the values it brings in pedagogy. In literature, social media tools are argued to provide opportunity in learning enhancement through assistance in social learning, encouraging students and instructors interaction, that enhances student-focused learning and active learning (Ajjan and Hartshome, 2008; BuzzettoMore, 2012; Taylor et al., 2012). In spite of these benefits potential and the values it brings in pedagogy, experts in this field criticize that most students and lecturers are unwilling to utilize teaching and learning tools (Ajjan and Hartshome, 2008; Hartshome and Ajjan, 2009; Stanciu et al., 2012). In the work of Taylor et al., (2012), it is suggested that in communicating and interacting academic matters through formal relationship with faculty, students are reluctant to use social media.

Even though, presently, there exists numerous studies focusing on the use of social media and its pedagogical values in educational setting by students and their instructors, there exists lesser studies focusing on the factors with regards to the attitude of students and their behavioural intention in utilizing social media for collaborative
learning in Malaysian context (Gikas and Grant, 2013; Hrastinski and Aghaee, 2012; Leng et al., 2011). Hence, the gaps in this knowledge is hoped to be filled in this research through developing a model on the usage of social media in collaborative learning with behavioural factors that influence teaching and learning among Malaysian students in higher education sector.

This project examined influential factors on students’ behavioural intention to use social media for active collaborative learning that affects teaching and learning. This study developed a theoretical model based on Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use Technology (UTAUT), and constructivism theory. TAM and UTAUT theory have provided evidence to be a useful model helping to understand students’ behavioural intention to use social media for collaborative learning. Meanwhile, constructivism theory provide evidence to be a useful model helping to understand collaborative learning and student satisfaction in social media implementation for collaborative learning.

This project is important to education field because in recent years, more research is keen on exploring the factors which have effects on the use intention among students in using social media technologies as it can be important indicators to integrate social media use for learning especially among students in higher education (Huang, 2015). This model may provide a conceptual foundation for understanding the behavioural aspects of using social media for collaborative learning in Malaysia.

**Usefulness**
The developed model can be used as a tool for assessing social media use for collaborative learning among student’s in higher education institution.

Stakeholders in higher education institution could decide on the appropriate action to be taken in order to influence students to use social media for collaborative learning purpose.

Also can provided guidelines for Social Networking Sites (SNS) vendors for product improvement.

**Commercialization value.**
Social networking sites vendor
Ministry of education.

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THE EARTH & UNIVERSE AUGMENTED REALITY EDUCATIONAL BOOK

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Highlights: Students have been perceiving even simple concepts in science are particularly difficult to grasp, since many ideas involve three-dimensional thinking. So, an Augmented Reality learning tool was developed to provide easy-to-use teaching/learning tools for learners and educators. The unique capability that allows virtual objects to appear in real world can serve as an effective tool to facilitate students to acquire better understandings on science and assist teachers to teach concepts that cannot be easily seen in a natural environment. Thus, AR-SMB has a bright potential for expansion and among potential markets include schools, parents and collaboration with publisher like Sasbadi/Pelangi.

Keywords: augmented reality; multimedia; educational technology; science; 3D modelling

Introduction
Learning science is not easy. Many of the concepts and phenomena they learn are not only new and unfamiliar, but they are also unable to directly experience it. Learning science may be crucial in early childhood, serving not only to afford opportunities for children to develop a better understanding of the world around them but also to build important skills and attitudes for learning. Even simple concepts in science are particularly difficult for students to understand, since many ideas involve three-dimensional thinking. However, much of the teaching materials used in science education are 2D in nature and there are still few targeted instructional materials for science concepts available for educators and learners. This may cause their losing interest in the subject, which would later render their negative attitude towards learning. Previous studies on science education have discovered that students commonly hold robust misconceptions that are fundamentally contrary to actual scientific concepts. These pretentious ideas are typically labeled as an alternative ideas or misconceptions in science education (Vosniadou & Skopeliti, 2017). According to (Taber, 2017) the alternative frameworks that students possess are beliefs and perceptions that differ from the beliefs of scientists. Students will hold this belief firmly and will affect their learning and this may cause their losing interest in the subject, which would later render their negative attitude towards learning. Hence, it is a great need for effective teaching tools that assist students in restructuring and changing their existing conceptual understanding. Thus, Augmented Reality (AR) may have the potential to situate students in conceptual knowledge development.

In an era of rapidly changing technologies, AR technology has received increasing emphasis and wide usage among educational practitioners and researchers. With the unique capability to display computer-generated information on top of a view of the real world, the comprehension of environments could be enhanced. So, an Augmented Reality (AR) learning tool called “The Earth & Universe Augmented Reality Educational Book” was developed to provide easy-to-use teaching/learning tools for learners and educators. The product is an AR book-based educational tool that allows the webcam to recognize pages in the book and turn them into 3D presentations to help students acquire new concepts and overtake misconceptions about science. The product provides both virtual and real world simultaneously to users and allows users to work in the real world and interact with virtual objects that are projected on real scenes around them. This capability makes this technology an interesting resource in any type of teaching that is unachievable with the use of other technologies. In addition, appearing of 3D objects in real world creates a magical feeling causing a high degree of surprise and curiosity that lead student to have more engagement in learning.

The product has an ability to encourage kinaesthetic learning. It allows students to manipulate the 3D virtual objects from a variety of perspectives to enhance their understanding by just using their bare hands. This friendlier
interface allowing users to use their hands to manipulate the visualizations rather than clicking and dragging the mouse which body movement helps people remember what they perceive and provides a cue for future recall. Furthermore, since AR use 3D registration of virtual and real objects, it could allow user to view the learning content in 3D perspectives. This affordance can help students who usually encounter difficulties to visualize the phenomena that are not possible to view in real world or complex concept. This can facilitate students to acquire better understandings on science and assist teachers to teach concepts that cannot be easily seen in a natural environment. AR can support students by inspecting the 3D object or class materials from a variety of different perspectives or angles to enhance their understanding. The AR environment also could boost students’ motivation and interest, which in turn could help them to develop a better understanding in learning contents. The product also enables student-centered learning as recommended in Pelan Pembangunan Pendidikan Malaysia 2013-2025. Furthermore, the product encourages students to engage in an interactive learning environment that makes learning interesting leading to improved academic results. The product also can encourage parents to involve themselves more in their children education by suing the product to encourage the learning and amaze their children.

The product also has been tested in a real setting where it involved 34 fifth grade elementary school students to incorporate the product in their teaching and learning process. The findings from the real settings showed that learning through the product has a statistically significant improvement on student’s science performance score and visualization abilities. The findings also indicated that most participants were able to shift from misconception to a scientific understanding after learning through the product. The findings of this research show that the integration of AR in learning was considerable effective in facilitating conceptual change. The amount of student-student’s interaction and students-AR interaction also were high indicating that they were really interacting and active in the learning activities.

There are no similar existing products in terms of the design and educational principles used in the current product. The product has been developed based on educational Predict-Observe-Explain inquiry-based learning design and the cognitive theory of multimedia learning (CTML). Unlike other AR applications, which require users to wear goggles or other head-mounted display devices, this invention is used without any devices on the user’s body. It only requires a laptop and a webcam to render virtual objects, small in data storage and can run on any platform ranging from Windows XP to Windows 7.

AR has a bright potential for expansion because of its affordability. Therefore, we can commercialize the product to all school since the subject content of the product was based on science syllabus. Among potential markets include schools, ministry of education, teachers, parents and collaboration with publisher like Sasbadi/Pelangi.

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A NEW APPROACH USING AUGMENTED REALITY VISUALIZATION TO IMPROVE TEACHING & LEARNING OF THE ANATOMY & PHYSIOLOGY OF CARDIAC CYCLE

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Highlights:
Our invention is with regards to the development of Augmented Reality (AR) for Cardiac Cycle through mobile devices (i.e. mobile phone and tablet). The cardiac computer modelling and simulation in three-dimensional (3D) reconstruction are novel methods for medical teaching in Malaysia. Due to the complexity and dynamic nature of cardiac cycle anatomy and physiology, teaching and learning (T&L) of the cardiac cycle need to be improved in order to allow better understanding of this particular subject. The easy access of the mobile phones and tablets from educator and student personal space will empower the effectiveness of the T&L experience.

Keywords: cardiac cycle, heart, anatomy, physiology, augmented reality, e-learning

Introduction

The cardiac cycle is a hemodynamic activity that is driven by consistent pumping of the heart allowing blood to flow to other parts of human body. The beginning of heart beat to the next heart beat is known as the CARDIAC CYCLE. There are 4 main components in cardiac cycle; electrocardiogram (the measurement of electrical voltage generated from the heart), cardiac pressure (the measurement of heart pressure in each chamber to determine the blood filling and blood ejection), cardiac blood volume (the volume of blood involve in cardiac cycle) and phonocardiogram (the heart sound produced as a result of turbulence blood flow once the heart valves close). All of these dynamics processes need clear and precise visualization in order to deliver this complex information effectively to the student. In the traditional method of learning and teaching, many of the medical lecturers adapt the two-dimension (2D) method through lecture slides, white board, medical books reference and other conventional methods. Therefore, the augmented reality (AR) can be an alternative method for teaching visualization.
Description & Background
AR is a technology that allows digital information to be utilised by users directly to their environment in real time. The cardiac cycle using 3D AR is developed based on normal cardiac anatomy and function. This involved modelling, mapping, texturing, animation and rigging of the asset and AR programming. Unity 2017.3.1 was used to develop the whole system of Heart AR. The programme combined all the multimedia elements in one application. The primary intent of this software is to develop games but still can be used to develop this system since it has Vuforia (AR) built-in and is an open source software. Unity interface was very user friendly. It used image recognition with the support for Android and Unity. Scripting the Cardiac AR application is done using Visual Studio 2017. Visual Studio 2017 is an open source integrated development environment for many types of operating system. In this case, this application was used Windows operating system. Blender is a professional free and open source 3D computer graphics software product used for creating 3D models and animations. Blender was used in Heart AR Application for creating and editing the 3D model of heart. By using a low poly to create the model, Adobe Illustrator CS6 was used to create the design interface for the whole application.

The Importance & Advantage to Education
The three-dimension (3D) AR method is beneficial as this can help both medical lecturers and students to T&L in cardiac cycle via 3D approach and more entertaining for lecturers and students to understand the cardiac cycle concept effectively. The AR method has been incorporated in medical field started from the early 1990s (Sielhorst, Obst, Burgkart, Rienner, & Navab, 2004). In 1998, Fuchs et. al. designed a 3D AR approach to assist laparoscopic surgical procedures (Fuchs et al., 1998). The AR method was also used by a group of surgeons for breast cancer surgery in Japan (Sato, Nakamoto, Tamaki, & Sasama, 1998). Birkfellner introduced new technique oral implantology using AR (Birkfellner et al., 2002). In one study comparing traditional method to AR, they found AR offers possibilities to significantly improve learning process especially for visually oriented people in medical education (Jan, Noll, Behrends, & Albrecht, 2012).

Commercial Value
The AR of cardiac cycle can be used in an innovative way for education commercialisation. This product could provide a cheaper solution for medical education through online market (i.e Google Play Store, Amazon.com, online website). The easy method to purchase this application through online platform is another strong advantage for local and international commercialisation. The product is not only suitable for lecturers and students in medical line, but can be used for public as well. Based on the PwC’s 2017 Global Digital IQ® Survey, the AR investment by industry will increase substantially from 10% today to 23% in 3 years (Digital IQ®, 2017). Report by World Economic Forum, stated that AR and VR (video reality) are expected to grow in $95 billion market by 2025, including applications in healthcare and education (World Economic Forum, 2017).

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DIGITAL AUTISM SCREENING INNOVATION: AUTISM KITS

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Highlights: Autism Kits can be an early detection tool that can be used for special education teachers to screen visual perception problems among autism. Early detection means earlier access to intervention. Students with autism have a high incidence of visual perception problems. Digital technologies are easily accessible and widespread which allows using them to provide students with new opportunities. Results positively show that the use of Autism Kits can help teachers screen visual perception problems in autistic students and it can complement manual and conventional tests. It shows that using the serious game approach effectively engages autistic students as compared to using the conventional approach.

Key words: autism, digital technology, serious games, screening, visual perception

Introduction
Autism Spectrum Disorder (ASD) is a developmental disorder, characterized by social difficulty in communication and interaction with others and (ii) repetitive behaviours. It is reported that 1 in 68 children (1 in 42 boys and 1 in 189 girls) in the USA has been diagnosed with ASD, and its worldwide prevalence is increasing more rapidly than other mental disorders (Christensen et al., 2016). According to Howlin et al., (2004), the number of diagnosed autistic children is increasing. Wan and Hisham (2013) stated that autism cannot be detected from birth, and only when the child is around 18 months of age could a brain disorder be detected (Wan and Hisham, 2013). They love to interact with technology and video games and become attached to a particular interest like dinosaurs, trains or outer space (Hung et al., 2018). Children with ASD symptoms have more learning problems and other developmental delays (Nadiyah et al., 2014). They often have difficulties in recognizing, remembering, organizing and interpreting visual images like written or pictorial symbols for learning (Kurtz 2006; Che Ku Nuraini et al., 2019).

The signs of ASD are usually evident in early childhood. Though it is still considered a lifelong diagnosis however with appropriate early intervention, individuals with ASD can lead productive, inclusive, and fulfilling lives. Many children with ASD do well in school, participate in activities they enjoy, go on to college, and are employed in adulthood. For most parents and professionals, ASD can be a very puzzling and complex disorder. Though a great deal of its mystery has yet to be uncovered, we know much more about it than we did 10 years ago. Just as our understanding has evolved over the years, so has the way we define, diagnose and treat ASD. Children with visual perception problem have trouble in recognizing, remembering and organizing visual images as required to comprehend the written and pictorial symbols pertinent for learning. Other than having difficulty in learning to read, these autistic children also have difficulty in comprehending the symbols employed in learning other subjects. This is because they often experience structural or functional vision disorder. Nevertheless, reading difficulty also occurs in children without these disorders (Kurtz, 2006). Even though there are various consistent characteristics that appear in all or most autistic people, Autism Spectrum Disorder (ASD) is a condition which affects individuals with varying degrees of impairment and it is a pervasive developmental disorder (Kazlowski & Matson, 2012). An appropriate use of ICT can raise educational quality and relate learning to real-life situations. Different countries have consistently initiated programs that are directed in making teachers adopt and use ICT in their day-to-day teaching and learning practices in school (Che Ku Nuraini et al., 2015).

Description of the Innovation
The use of information communication technologies (ICTs) in therapy offers new perspectives for treating many domains in individuals with autism spectrum disorders (ASD) because it is used in many different ways and settings and they are attractive to the patients. Students with autism have a high incidence of visual perception problems. They often have difficulty recognizing, remembering, organizing and interpreting visual images. The game known as Autism Kits which has been developed based on ADDIE model. It is able to screen autistic students without the need for teachers to have some experience and knowledge of diagnosing visual perception. Autism Kits Games is developed based on five (5) types of visual perception problems which are (1) visual discriminations, (2) spatial relationship, (3) form constancy, (4) visual memory and (5) visual closure. To diagnose each type of visual perception problem, the games are different from each other. They are Let’s Go Fishing Game 1, Let’s Go Fishing Game 2, Let’s Go Fishing Game 3, Let’s Go on a Safari, and Jigsaw Puzzle. Each of these games was evaluated based on the scores obtained.
Game 1 is for Visual Discrimination. The aim of this game is to detect the similarities in the given images.
Game 2 is for Spatial Relationship. The aim of this game is to identify differences between the images.
Game 3 is for Form Constantly. The aim of this game is to identify the different sizes of the given images.
Game 4 is for Form Visual Memory. The aim of this game is to identify the different sizes of the given images.
Game 5 is for Visual Closure. The aim of this game is to identify the problems of visual closure and complete the given picture.

Background of the Innovation
The methodology is used to develop the visual perception diagnostic tool. This study utilized the mixed method, using both the quantitative and the qualitative methods. ADDIE model is used as the research design to develop the visual perception diagnostic tool. This five-phase systematic model, namely Analysis, Design, Development, Implementation and Evaluation, is used to guide through the process of creating multimedia products for a variety of settings. Selection of the participants can be considered as a purposive sampling. Samples were identified and selected in accordance with some purposive principles such as accessibility. In addition, specific information obtained from the participants was relevant to the purpose of the study.

Important of Innovation to Education
The early detection of visual perception problems in autistic students and other children is important because it will help to prevent and overcome difficulties in recognizing, remembering, organizing and interpreting of visual images. It can also be suggested that using the serious game approach effectively engages autistic children as compared with the conventional approach. The results show that the use of Autism Kits successfully assist and facilitate teachers when making a diagnosis of visual perception problems in autistic students as compared with conventional methods of diagnosis. Diagnosing visual perception problems using serious games gives teachers and students enjoyable experiences in a way that no other medium can offer.

Advantages of the Innovation towards Education and Community
According to Ministry of Health Malaysia reported that 1 out of 600 children in Malaysia is autistic (Department of Statistics Ministry of Health Malaysia, 2018). The rising statistics show the importance of this initiative to support national agenda in reducing ASD. It is hoped that more effective diagnosis and treatment will be achieved. We are very appreciative to all of the families that have participated thus far and have helped us to explore the mysteries of ASD. By combining the expertise from various backgrounds such as Engineering, Social Science and Business Technology, it is hope that this integration will produce more marketable diagnostic tool Autism Kits. Besides that, we use multimedia technologies such as game technology to detect the genes that are associated with this disorder, and then pooled their results across sites so that meaningful conclusions could be made. Thus, comprehensive autism needs assessment survey of caretakers and professionals across the country, autism families are struggling to get the health services they need but cannot afford.

Commercial Value of the Innovation
Special education initiatives are getting important and play important roles especially to cater learners with learning difficulty. In the era of education, 4.0 we need to integrate advanced technologies to support learners such as the use of data analytics, Internet of Things (IoT), big data and intelligence features to ensure special learners will be benefited. Autism Kits is the alternative way to diagnose autism level. By using these games, children are tested to detect their autism level based on their score towards their perception without them being aware.

Results
The results show that the accuracy of the results of diagnosing visual perception in autistic students through the use of Autism Kits was significant. The results of both the quantitative and the qualitative studies are very encouraging. It shows that the use of serious games by using Autism Kits help teachers to diagnose visual perception problems in autistic students. The diagnostic sessions conducted by the teachers show clearly that autistic students accept serious games. The experiment measured the accuracy of the serious games and obtained the perception of the teachers towards the use of the serious games for diagnosing visual perception problems in autistic students. In addition, the results also reveal that the test scores resulting from the use of Autism Kits are accurate.

Conclusion
Overall, the study shows that the design and development of Autism Kits help to assist teachers in diagnosing visual perception problems in students. This study has also helped provide autistic students with an application that can help them to participate in a diagnostic test with low stress, low anxiety and in a fun, enjoyable and rewarding atmosphere.

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References
CREATIVECULTURE: LEARNING THROUGH PLAY

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Highlights:
The CreativeCulture project has successfully implemented participatory studies that have effectively infused the CreativeCulture model to assist and accelerate learning for children especially in remote and rural locations in Sarawak. The CreativeCulture model is built upon playful and gameful design (based on the GameChangers initiatives). The localised and indigenous programme has been deployed in the rural schools in Borneo Malaysia (see http://mycapsule.my). A number of developed tools, innovative space; creative and educational products were built and aligned with the inclusion of Arts in Science, Technology, Engineering and Mathematics education (STEAM) and computational thinking. These products are published under the Creative Commons License.

Keywords: Gameful learning, design thinking, co-creation, STEAM

Introduction
The CreativeCulture models focuses on the potential of playful and gameful approaches for extending engagement to formal methods as an important means for promoting anytime anywhere and lifelong learning and, subsequently, for reshaping learning to better match the needs of the 21st century knowledge economies and open societies. We have explored, exploited and experimented the impact of arts, design and culture in enhancing creative thinking, problem solving and development in education through game design and computational thinking.

To support this extension, we have designed an innovative space that incorporates the philosophy of CreativeCulture. The learning space is crucial to set up the environment to facilitate the delivery, application and assessment of learning also in both formal and informal context.

Innovative products and services
These are the products and services that are offered by CreativeCulture.

Innovative collaborative space design
This space together with the flexibility of the ergonomics and movable furniture enable collaborations and convergence of those with diverse backgrounds and interests in a shared space and allows one to engage with a variety of activities. This learning space is also integrated with relevant technologies and mirrors values that scream openness, sustainability, collaboration, creativity and innovation.

Co-creation tools
Blueprint: The blueprint contains the framework of how game-based learning and game design thinking can be used as part of teaching and learning in Malaysia, intended to guide educators/teachers who are keen to begin Gamification in Learning.

Game Design Thinking tools: A number of tools can be used as to guide the thinking process and help users to identify, consider and decide each phase of GBL (game-based learning) construction, to match the requirements and needs of their own teaching contexts in a compressed timeframe.

Professional Training and Development and Business Opportunities
Game design thinking
Emphatic robotic
STEAM learning
Creative entrepreneurship
Background of CreativeCulture

The project is adapting the game design thinking approach of the already established Coventry University's GameChangers (http://gamify.org.uk) initiative, where we believe that we can use games for engaging students’ learning and that teachers and students can co-create game-based resources for their teaching and learning activities. The approach has been expanded to engage teachers and primary school students in more than fifteen different rural sites in Sarawak, Malaysia, where engagement with education, in general, is very low. The UK and Malaysian team have conducted pre-feasibility and participatory workshops and studies that have informed the CreativeCulture blueprint and game-based learning resources have been co-created by the participating teachers, which were implemented in five rural schools with positive response and feedback.

Importance and significance

The project explores the importance of arts and creativity in STEAM education by looking at games as an innovative educational tool and gameplay as cultural relevance. Engagement with games is believed to be a powerful enabler to inspire how learning experience can be designed in a playful manner. The long term outcome of the CreativeCulture model is to inspire the younger generations in the impact of creativity and co-creativity in their schools and also communities. The project has contributed towards the UN SDG in relation to leveraging and scaling up the innovative approach to increase the quality of teaching and learning in Malaysia while providing access to creative and research-driven methodologies for creating innovative teaching and learning resources. The project lowers the barriers to access for innovative educational techniques and empowers teachers to be co-creators of their own instructional resources.

With the current emphasis by the new Minister of Education Malaysia to use innovative approaches like Gamification in the classroom, these co-creation tools will be useful to enable educators to be onboard with Gamification in Learning. The direct impact is seen through the rate of engagement with students, and how well they are able to comprehend and make sense of the learning content presented to them through game-based learning.

Advantages toward education and community

The CreativeCulture model is aligned with STEAM, realising the potential of these subjects by enabling true innovation and new thinking through creativity. Art and culture boost creativity and creativity leads to innovation, new thinking and moving beyond existing skills; all together are triggers and needed in the social and economic transformation. This is particularly timely as Malaysia is progressing along its journey of economic development and societal change. Since the potential is vast, CreativeCulture would make positive contributions to prosperity of society through education and economic impact to the community, which are also the indicators of the impact goals in the United Nation SDGs.
Commercial values and future works
The innovative CreativeCulture approaches in Sarawak have attracted interests from the press and major television networks: the team have been interviewed on live television (discussing ‘The Future of Learning in Sarawak’) and have also been involved in a television panel show that focussed on the economic and societal development of Sarawak. The project has also been showcased as a case study on the AHRC research site. Printed copies of the blueprint have been distributed to the local teachers, students, lecturers and public/private agencies including the Ministry of Education in the recent Gamification Seminar - the first seminar of its kind for the educators in Sarawak, Malaysia. The innovative collaborative space has open potential cooperation of the parties with respect to technology transfer and commercialisation, including training, organising events to create business opportunities and developing professional development and human capital development programmes.

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ADIK – ADIK SOLAT: THE DEVELOPMENT OF MOBILE LEARNING APPS TO ENHANCE LEARNING EXPERIENCE IN PRAYERS TOWARDS EDUCATION 4.0

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Highlights: This paper discusses the development methodology of “Adik-Adik Solat” a Mobile Learning Apps for students to enhance their learning experience in Prayers (Solat). It also identify the criteria needed to be implemented so as to enhance the learning experience. The design and development process need to consider several critical success factors such as the use of attractive colour, animation, graphic, text and audio in order to optimize the learning engagement. This will allow the learning process to become more fun and meaningful. It will also embrace the student’s skills on critical thinking, problem solving, creativity and many more positive aspects. To justify the objectives, the student’s engagement during learning session is observed to see the enhancement of students’ learning experience. This application is very important as a social respond to instill faith and Islamic values towards young generation.

Keywords: Mobile Learning Apps, learning experience, collaborative learning, Education 4.0

Introduction

Mobile learning (M-learning) is an educational system that soon will replace traditional leaning systems. M-learning supported by mobile device ensures a continuous learning process. M-learning enables users to experience learning process anywhere and anytime. Thus, making learning experience more fun with an interaction that engaging learning environment using VAK method (Visual-Auditory-Kinaesthetic). However, there are still problems and challenges including to understand the critical success factors on the development of M-learning apps that suits the students.

Description of innovation

To be recognized as a successful believer of god, being engrossed in solat is the key factor that has a positive impact on the individual’s prayers. Allah says in Surah Al - Mukminin 1-2 verse that: “Successful indeed are the believers, those who humble themselves in their solat. The term solat is synonymous with prayer which means action worship Allah S.W.T. For non-Muslims, the term prayer gives meaning to God (Noresah, 2005). Amongst Sufi members, the term solat is defined as “Facing the heart [soul] to Allah S.W.T. where it brings fear and growth in the soul of his greatness and power” (Abdullah al-Qari Hj. Salleh, 1994). The term also brings understanding of “wishes” (Ibn Manzur, 1956) or “wishes for good” (Al-Zuhayli, Wahbah,1997). When referring to Tafsir al-Qur “an al-Karim, the term solat refers to the prayer bringing peace, strength, persistence and confidence (Al-‘Arabi, 1968). Therefore, solat can be formulated as surrender [soul] to Allah S.W.T., surrendered with all intentions, planted the greatness of His Greatness and His Ruler ship with sincerity and sincerity in some words and deeds that begin with the “Takbiratul Ithram” and ending with greetings (Salam). But, from our observation, survey and investigation we found out that young generations tend to neglect solat because lack of knowledge about solat they and do not find solat as their first priority. As a social response towards this situation and a belief that education can change the situation we decided to develop “Adik-Adik Solat” as a mobile learning app to enhance learning experience for solat so that the knowledge of solat can be spread widely and effectively.

M-Learning is an educational system which engages students to self-learning with their mobile devices. It is in line with the desire of the Education 4.0 concept that the learning process can be conducted anywhere and anytime. This allows the studies environment to be more fun and more meaningful to the students. M-learning is growing in popularity due to technological developments in 21st Century Learning method (PAK-21) (Malay Mail, 2018) which promotes dynamic and creative methods towards productive and critical thinking. M-learning exist in many different
forms for example audios, words and videos. There are two ways of M-Learning, the first one is an asynchronous way which is a learning without an interaction such as preparing homework while watching a video. The other is the synchronous way which enables the user to interact by using an application with the content or get a direct feedback from a teacher (Brian, 2015).

To enhance the learning experience it is believed to that a collaborative learning style takes place. Collaborative learning is an educational approach to teach and learn that involve a group of students (Gerlach, 1994). This method involves a group of student discussing with each other in order to achieve a significant result and a meaningful project. According to (Gerlach, 1994), collaborative learning is a natural social act which the participants talk among themselves. This method creates an opportunity where a passive student involves themselves in the discussion, a teacher can learn a few things from their students and students can achieve meaningful studies from the discussion. Collaborative learning allows students to co-operate with each other to strengthen their skills as well as develop their weaker skills (Fuchs et. al, 1997).

To support the government with PAK-21, we decided to develop a mobile learning application as a new platform for our target user (7-9 years old) to learn about Salat. Between the ages of 7-9 years old, the cognitive level is at the concrete operational stage where students in this age range concentrate more on what they are doing [6]. In this module, we use Visual, Auditory and Kinesthetic Learning style (VAK) on how to recite the niat, perform wudhu, solat and also other simple games to enhance students experience learning better. We hope that, by developing this application, we will help the user to gain more knowledge and experience about solat.

Background of the innovation and development.

Figure 1: ADDIE Model

The methodology used to develop the application is ADDIE (Analysis, Design, Development, Implementation and Evaluation). This method of instructional design has a proven record of success (Branch, 2009). In the first phase, an analysis is conducted to get the information regarding the user requirements and the operating system (OS) before developing the application. From the survey of Mobile Operating System Market Share in Malaysia it is found that 84.25% are Android users (Table 1). This is due to the fact that Android is an open source and has free licensing OS. With the spirit to penetrate more users and to increase commercial value, the application was developed using android-based apps.

Table 1 :Mobile Operating System Market Share Malaysia

<table>
<thead>
<tr>
<th></th>
<th>Android</th>
<th>iOS</th>
<th>Unknown</th>
<th>Windows</th>
<th>Samsung</th>
<th>Series 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>84.25%</td>
<td>13.52%</td>
<td>1.65%</td>
<td>0.13%</td>
<td>0.12%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Secondly is the design phase where the storyboard and interfaces take place. This phase illustrates the overall implementation of prototypes through story boarding methods. Storyboard design shown in figure 1. The story boards are separated into four parts based on the learning module. The first part is on how to learn “Niat”. The second part is the application on learning how to perform “Wudhuk” while for the third part is about “Solat” and the final part is games.
Figure 2: The Design and Storyboards

The third phase is the development phase. The application is developed based on the information of specifications and requirements obtained from the design phase. Certain software has been used in the development process such as using Adobe Animate cc. In the implementation phase, the complete application will be testing to find errors that might occur and improvements will be made. Then a survey was conducted to obtain feedback from users. The final phase is evaluation. In this phase the application will be assessed based on the capabilities and effectiveness of the developed application.

The application development is based on a few critical success factors to enhance students’ learning experience. The factors that need to be considered were the use of attractive colour, animation, graphic, the use of text and the use of audio. The first element is use of attractive colour. Colour is an important aspect after functionality for an application (Nick, 2017). The human and computer interaction is heavily based on interaction with Graphical User Interface (GUI) elements and colour plays as an important role in the interaction. The combinations of attractive colour were used in designing the interface to make user interested in using the application. The second element is the use of animation in the application. Animation bring out scenes that can attract more attention from users especially kids while using the application. With animation, it looks like a character is alive and moving. It is much better than looking at a static character without any movement. Moreover, learning through animation has no age limit and it can be used for early childhood, in primary and high schools, and even in universities (Lilian, 2015). Using graphics in the application help user in understanding better during the learning process and also help them to remember easily. For example, use the picture of an animal as a button and when user click the button it will show how to spell the name of the animal. The use of text is important and must be able for user to understand what we want to tell user to do. So, the size and the type of text uses must be suitable and be easily understood. The last element is audio. It is important to provide a non-boring atmosphere while using the application. The use of audio also helps in presenting the information to the user. Use of audio also can attract user when using fun and enjoyable audio. To validate these factors, we observe students using the apps.

Application testing is an investigation conducted to provide stakeholders with information about the quality of the application or software product or service under test. This test session was held at Sekolah Agama Sungai Suluah, involving 18 students, aged 7-9 years old to identify if they had problems to learn solat at school. Before this testing session, a demonstration session was conducted with students and teachers. After the demonstration, a test session was conducted by the teacher to test the effectiveness of the students in the learning session using the application as compared to traditional learning. As a result of the testing process for learning Niat, 90% of the recitation is
satisfactory. Often, it is difficult for teachers to teach students but with ‘Adik-Adik Solat’ application, students can learn easily and is more appealing.

Analysis focuses on the level of learning engagement of users. As a result of the analysis, more than 95% agree that the learning engagement increased due to the use of the application. Accordingly, the application makes them more interested in using it. This proves that the app is suitable to attract students to the learning process. We also look into usability factors because it is important to have an application that is easy and able to be handled by the user with less instruction. Result shows 85% agree that usability of the apps is great. The result of the survey is as shown in Table 2.

Table 2: Results for evaluation

<table>
<thead>
<tr>
<th>Importance to education</th>
<th>Learning Experience</th>
<th>Learning Engagement</th>
<th>Usability</th>
<th>Interactivity</th>
<th>Understandability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>90%</td>
<td>95%</td>
<td>90%</td>
<td>85%</td>
<td>90%</td>
</tr>
</tbody>
</table>

**Importance to education**

The following are some of the importance of Adik-Adik Solat to education:

**Students**

- It will help students to enhance their learning experience in solat.
- Students will become more engaged with the subject and will be highly motivated to learn.
- Embrace the student’s skills on critical thinking, problem solving, creativity and others.
- The values of faith in students will be increased.
- First step towards great Muslim.

**Teacher/Institution/Government**

- Helping the teacher to implement a new method of teaching solat.
- Increasing the teacher’s passion on teaching Solat.
- Helping the institution to achieve higher performance in solat.
- More people are able to learn solat and encourage the understanding of Islam.
- Supporting the government on Pelan Pendidikan Tinggi Nasional, Dasar e Pembelajaran Negara in terms of e Content
- Helping the environment by reducing text book material (paper less).

**Advantages of innovation towards education and community**

Adik-Adik Solat will help students to enhance their learning experience in learning solat. This is due to the fact that students will become more engaged and will be highly motivated to learn. On top of that, it will also embrace the student’s skills on critical thinking, problem solving, creativity and many more positive aspects. As a whole by having this innovation, students will have a new great perception on learning solat.

For the teachers, it will help the teacher to implement a new method of teaching solat. Via that, the teacher’s passion on teaching solat will be increase. When students and teachers are motivated by the positive environment it is believed the school / institution achievement and performance will also be increase.

As for the community, we will have a young generation with rich values of faith and self-esteem. As a whole this initiative will support the government on Pelan Pendidikan Tinggi Nasional, Dasar e Pembelajaran Negara in terms of e Content. Finally, least but not least, it will help the environment by reducing text book material (paper less).

**Commercial value**

Adik-Adik Solat can be commercialized to all Islamic School in Malaysia, Preschool, Hidayah Centre in order to help teacher and students implementing a new approach in teaching and learning solat. Furthermore, it will also available in Google Playstore and can also be embed with Augmented Reality (AR) signage in the text books.

**Acknowledgement**

This research is conducted by Information Technology as Enabler (iCAN) Focus Group, Department of Information Technology, Centre of Diploma Studies, Universiti Tun Hussein Onn Malaysia (UTHM) with the Co-operation of Sekolah Agama Sungai Suloh, Batu Pahat, Johor, Hidayah Centre, Batu Pahat and supported by Dewa Master Sdn Bhd.

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INNOVATIVE LEARNING: AN ANALYSIS OF SERVICE BASED LEARNING COURSE

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Highlights: Innovative teaching and learning emphasize on the improvement of students and educators’ active involvement during the teaching and learning process. The teaching and learning process should not only be the responsibility of the educator but also the involvement of the stakeholders such as the industries and local communities through experiential learning. Methods of teaching and learning nowadays are moving towards the usage of the technology. Teaching in the digital era provides more platform to the educator to enhance their teaching and learning skills by developing new methods such as online collaborative learning which believes to promote student-centred learning.

Keywords: Innovative teaching and learning, experiential learning, online collaborative

Introduction

Nowadays, teaching and learning process become more challenging due to advancement in technology. The trend of e-learning is increasing day by day through the usage of blended learning (Manjot Kaur, 2013). As for the educators, collaborative approach in teaching and learning is vital in ensuring the education system will provide effective teaching for all. Collaborative teaching is important for effective learning. Therefore involvement of industries in collaborative teaching leads to growth in students knowledge, skills and wellbeing. It is important to note that collaboration and responsibility should extend beyond the university itself.

Teaching and learning responsibility should be shared for the development and implementation of a rigorous curriculum and multiple assessment of students learning (National Education Association, 2011). To capture the students’ attention, advancement in teaching and learning process is crucial. According to CETT (2012), the availability of the Internet led to the development of constructive teaching called networked learning, originally known as computer-mediated communication. Teaching in a digital era provides more platform to the educator to enhance their teaching and learning skills by developing new method such as online collaborative learning (OCL). Figure 1 illustrates the online collaborative learning.

Figure 1: Online Collaborative Learning

Source: Harasim 2012

According to Harasim (2012), although the OCL is not considered to be sufficient for learning and knowledge construction, the essential element for learning and knowledge construction should not only involve the educators in the faculty per se but also a group of individuals who are collaboratively engage in a meaningful discourse.
Development Planning and Management Program (WA22) is designed to equip students with the latest technical skills and knowledge in the field of development studies. The significant aspects in the curriculum include exposing students to the use of technology in development planning and management activities. WA22 program also adopts a multidisciplinary approach and scope to expose students to the studies of sociology, economy and physical environment. Students learn theories and skills in development studies to enable them to play their roles effectively in working with individuals, groups and communities. Students collaborate with industries through Service-Based Learning (SBL) which combined class work with real-life experience in serving the communities. SSR3074 Social and Environmental Impact Assessment (SEIA) was selected as a course for SBL at the Faculty of Social Sciences and Humanities. SEIA was selected for the reason that this course provides students with direct experience with the issues they are studying and also in line with the program’s effort of working with communities and industries. Students were given the opportunity to learn in real-world settings and reflect in class on their service experiences by using digital platform such as eLeap.

There are three main objectives for conducting SBL for this course namely (i) to integrate academic studies with practical real-life experience (ii) to enhance teaching and learning through digital platform and (iii) to engage students, industries and community that will create a legacy engagement for future benefits. To assess the students, there are three assessments (i) individual assessment, (ii) short test and (iii) Group project. This year, students were brought to Kpg. Telok Melano for their their fieldwork. Students were assigned to conduct Social Impact Assessment within the vicinity of the village. Before the fieldwork, students were given a lecture on Social and Environmental Impact Assessments and its application. Fieldwork will be conducted during mid semester break. Students also visited relevant industries such as the Natural Resources and Environment Board (NREB) and opportunities were given to other experts in UNIMAS to share their knowledge on the course. This experiential learning not only focus on the educational experience but students were also exposed to the usage of digital platform as part of their tool in learning. In Austria, there is an increasing number of the usage of e-learning (Paechter, Maier & Macher, 2010) and 60% of university students reported they have used the e-learning platform (Unger & Wroblewski, 2006 in Paechter, Maier & Macher, 2010). Students were encouraged to use eLeap application as part of the tools in learning. Discussions were conducted via online forum which enables the students to share and collaboratively construct knowledge in fulfilling the task of the course. Students were given reading materials and they discuss on what they read and posted their findings on the digital platform (eleap). Students knowledge were also tested by using gamified quiz (Quizizz). This is how we used the online collaborative learning.

Innovative teaching and learning is important for education because it has the potential to increase student achievement and engagement with the industries/community. Therefore, adopting experiential learning as part of teaching and learning delivery while combining it with e-learning application aims to equip students with more experience in learning rather than only focusing on conventional ways of teaching. Students should be exposed to the industry/community where they can gain more experience in a real working setting. As mentioned by Keeton and Tate (1978 in Kolb & Kolb, 2017) “Learning in which the learner is directly in touch with the realities being studied. It is contrasted with the learner who only reads about, hears about, talks about, or writes about these realities but never comes into contact with them as part of the learning process”. It is crucial to enhance the teaching and learning method to be aligned with UNIMAS focus in nurturing future graduates and to form future ready curriculum.

Acknowledgement
We are grateful to have Pustaka Negeri Sarawak, for giving the opportunity to work together with them in their Program PaNDEI (People Accessible, Network for Digital Empowerment & Inclusivity) during our educational trip to Kpg Telok Melano and NREB (Natural Resources and Environment Board Sarawak) for contributing the knowledge to the students which will benefit them in their study.

References
APPRAOCH AND PROCESS OF LEARNING: EVERYTHING IS A LEARNING OPPORTUNITY

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The poster presentation is based on one of the compulsory courses offered to undergraduate students (Third Year) in Social Work Studies Program, Faculty of Social Sciences and Humanities, UNIMAS. The course title is SSS3074 Fieldwork Practice/Praktis Kerja Lapangan. This course requires students to be attached to assigned agencies for one semester. Students are required to do a weekly placement at their respective assigned agencies and to attend fortnightly discussion groups on campus (for one semester). The placement gives students the opportunity for direct contact with clients/target group, at a level that commensurate with the students’ abilities and the time-frame of their placement. The fortnightly discussion groups on campus and all graded assignments are designed to consolidate the students’ learning by integrating their experience gained from placement with the knowledge gained from other social work courses. Particular attention will be given to help students develop their assessment skills, practice of social work values, applying theory in practice, and self-awareness in doing social work. eLEAP(eLearning) was incorporated as a medium/channel of disseminating and updating information, sharing, a medium of communication/chat groups, feedbacks, reflections and incorporated with their written assignment. The approach and process of learning in the course incorporated and integrated everything as a learning opportunity for the students. It is one of the transformative teaching practices, which provide learning opportunity for them on a journey to professional social work.

Keywords: Weekly Placement, Discussion Groups on Campus, Approach, Learning opportunity
GAMIFICATION IN EDUCATION: YOU DID WHAT?

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Introduction
Gamification in education motivates students to learn through game-based dynamics and elements in learning environments. It educates the learners and promotes game thinking. You did WHAT? is a game that is based on a web application security subject. The objective of creating the game is to educate users about web application’s security risks and how to mitigate the attacks. The genre is a visual novel game incorporated with an interesting storyline to attract users playing the games. It is a 2D game with 2 chapters of storylines. The first chapter explains from the students’ perspective and in the second chapter, the storyline resolves from the perspective of an IT manager. Users need to select their choices using mouse. There will be dialogues and monologues throughout the game. TyranoBuilder is used as the game development tool, which is free and playable across various platforms. All characters in the game are based on the existing assets provided by TyranoBuilder. The content consists of 8 questions with enjoyable aesthetic interfaces. Compatibility testing, features testing, sound testing and usability testing were done. 22 users tested the game and gave feedbacks. It is hoped that this game can help to increase the user’s knowledge on web applications security.

Keywords: Gamification, education, visual novel game, web application security

Objectives
To create a game that can educate users on the web application security risks and ways on how to mitigate these attacks.
To use game development methodology and game builder software to develop a game that can fulfill the user’s needs.
To utilize gamification in education technology as a platform to promote educational games that can be beneficial for users especially schoolchildren or university students.

Overview
Figure below shows the overview of You did WHAT? game.

![Overview of You did WHAT?](image)

Figure 1: Overview of You did WHAT?

Value Added
This product is the implementation of game-based dynamics and elements in learning environments. Gamification in education approach motivates students to learn through interactive visual novel genre thus increasing their knowledge in web application security.

**Commercialization Potential**

Introduce a visual novel game genre as one of the new way delivering knowledge. It also can help to motivate learners to learn the web application’s security risks and countermeasures through an interesting storyline.

**Reference**


IMPROVING STUDENTS’ SPEAKING SKILLS USING A CONVERSATIONAL ROBOT IN MANDARIN COURSE

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Highlights: Providing an online language learning such as MOOC is a challenging effort. Our preliminary study on 38 students showed that their self-efficacy in speaking competency level was only 41%. To overcome this, we proposed an intelligent conversational robot for students to practice and improve their Mandarin speaking skills to complement language learning via Mandarin MOOC.

Keywords: Mandarin, Chatbot, speaking skills

Introduction
Real advancement in language learning comes by practicing. Online language learning are rarely holistic educational tools. To really learn a language, an equal attention needs to be given to vocabulary, grammar, reading, speaking, writing, and listening, but many online courses do not support all of these (Beck, 2014). Majority of language learners may agree the fact that they need to speak to really learn a new language. Language expert suggests that an effective method includes getting a tutor, making friends with whom know the language, or maybe talk to oneself while driving. Experts also said that we can build confidence and get feedback by speaking with a person. Learners can also try using Siri or Siri Translate or Google Assistant to learn a language but there are still limitations (Siri, 2019).

Social Learning Strategies
People actually learn from each other and learning happens when people generate information through observation, imitation, and modeling (Bandura, 1977). Our Mandarin MOOC was designed according to Bandura’s key principles of Social Learning Theory (1973) (1977) & (1986) and Spencer’s (2015) recommendation on ways in using technology to implement a social learning strategy in e-learning. Spencer (2015) recommended three main categories of conditions that contribute to effective modeling during the learning process: 1) Attention – various factors may affect people attention including individual sensory capacities and past reinforcement, 2) Memory – includes people retention and reproduction ability, and 3) Motivation – which cause people to imitate what they learned. As an effort to continuously improve the quality of our Mandarin MOOC course, we enhance the MOOC course with an intelligent tutoring system called MandarinBot as part of the Observational Learning strategies. Table 1 shows various social learning strategies applied in the Mandarin MOOC course for each category of the principles in Social Learning Theory.

Table 1: The application of social learning strategies in Mandarin MOOC course

<table>
<thead>
<tr>
<th>Key principles of Social Learning Theory</th>
<th>Social Learning Strategies applied in MOOC learning design</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observational Learning</td>
<td>Learner Video</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Dialogue Video</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Language Clinic (Video Conferences)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MandarinBot (ChatBot)</td>
<td>1</td>
</tr>
<tr>
<td>Memory Retention</td>
<td>Interesting Forum</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Mini Project</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Knowledge Sharing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Peer-To-Peer Activities</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Slide</td>
<td></td>
</tr>
<tr>
<td>Motivation &amp; Reward</td>
<td>Credit Transfer</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Certificate of Completion</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Badges</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Points/Marks</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Bonus Points</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Progress Checklist</td>
<td>Yes</td>
</tr>
</tbody>
</table>
**MandarinBot Intelligent Tutoring System**

MandarinBot is a new tool introduced for students to practice in improving the Mandarin speaking skills. It is provided to complement language learning via Mandarin MOOC. A conversational robot (chatbot) is designed by allowing learners to speak to the MandarinBot by saying any phrase in Mandarin and the bot will translate the phrase so that the learners can go on practicing until they can speak their intended phrase correctly. The chatbot is designed by using Amazon Lex, Translate, and Polly that combine intelligent conversational robot ability with Mandarin to English (speech to text) and text to speech. Figure 1 shows the architecture of MandarinBot Speaking Tutor.

![Architecture of MandarinBot Speaking Tutor](image)

**Commercial Value & Copyright**

In terms of commercial value, the conceptual design framework of the MandarinBot Speaking Tutor can be applied in the development of language speaking enhancement tool. We have filed two copyrights entitled 1) MOOC Learning Design for Mandarin Learning that Applies the Proposed Conceptual Model (CRLY00013612) and 2) An Adaptive Self-Assessment Model for Improving Student Performance in Language Learning using Massive Open Online Course (MOOC) (CRLY00013614). A new copyright entitled “Model for Enhancing Mandarin Speaking Skills using a Conversational Robot” is being prepared for filing.

**Acknowledgement**

This research is conducted by Pervasive Computing & Educational Technology Research Group, C-ACT, Universiti Teknikal Malaysia Melaka (UTeM).

**References**


DeTAR Putra, Universiti Malaysia Sarawak
ARMAYA: ALTERNATIVE READING PLATFORM BY INTEGRATING AUGMENTED REALITY AND VIRTUAL REALITY IN MOBILE APPLICATION

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Highlights: ARmaya is a mobile application that integrates technologies of Augmented Reality (AR) and Virtual Reality (VR) with advanced interaction for reader who wants to enjoy science content. ARmaya provides an alternative and fun experience for learning and reading with advanced interaction where user can explore the 3D object. The contents were developed by adapting Know-Learn-Use (KLU) strategies of edutainment design. ARmaya can be a learning companion anytime and anywhere.

Keywords: Augmented Reality, Virtual Reality, Learning, Reading, Advanced Interaction

Introduction
Augmented Reality (AR) is an interaction experience for a real-world environment, where objects in the real world are “added” by perceptual information generated by computers. On the other hand Virtual Reality (VR) is an interactive computer generated experience that occurs in a simulated environment, where it combines mainly auditory and visual feedback and also allowing feedback from other senses. This in-depth environment might be the same as the real world or it might be a fantastic world of imagination. In today’s scenario, people are more likely to use their smartphone to gain knowledge and because of this less people will read books and apparently our new generation are not interested with book. Because of this situation, today’s generation especially kids don’t like to read books but always play with smartphone to play games or watch something unbeneficial. With the AR and VR technology, we make reading books and learn to be more fun and interactive and at the same time can improve student’s cognitive ability while learning.

Novelty
1. ARmaya is an alternative platform of e-library for reader to explore, search AR Books and execute the AR without install every AR Books.
2. Easy to manage and update contents.
3. ARmaya user can experience AR and VR technologies with their own smartphone and can interact with the 3D object with their own hand without any hand tracking device.

ARmaya helps people learn and give fun and interactive experience for reading with the AR and VR features. By using smartphone, people can gain new experience of learning and reading with the AR and VR technology. ARmaya included an advanced interaction technology where people can interact with the 3D object by using their own hand without any extension hand devices.

The idea of ARmaya is to attract children to read book and have fun with it while they can learn something new. The edutainment design concept applied in each activity. AR and VR technology can help to provide an alternative approach to gain people attention to explore and complete the activities. Other than that, with advanced interaction technology, ARmaya can helps to ease the learning process for schools or university student. With this technology, they can learn certain subjects such as science, geography, engineering, or any subject more easily with the 3D graphic animation and with the advanced interaction technology, the learning process will be more interactive and fun.
Based on the constructive philosophy in Edutainment Design, the book has been developed based on KLU strategy (Know-Learn-Use). The activities were designed based on the level of challenge that maintain learner’s motivation to read and explore the book inside the ARmaya.

![Edutainment Design in eProjBL model](image)

**Figure 1: Edutainment Design in eProjBL model**

**Commercialization**

ARmaya Application is free in mobile platform. However, people need to buy the hardcopy books which published by ARmaya before they can use with the app. ARmaya also invited other individual or organization to contribute their contents to publish using ARmaya. They just need to subscribe to ARmaya. ARmaya also have online store to sell the books or merchandise under ARmaya.
Figure 2: ARmaya.

Acknowledgement
Alhamdulillah, our heartfelt thanks goes to the Ministry of Education; Associate Prof. Ahamad Tarmizi Azizan from Universiti Malaysia Kelantan; lecturers of the Faculty of Creative Technology and Heritage, and faculty administration for this support and involvement in this reviewed. Last but not least, to beloved families’ assistance has been very valuable and inspiring to us. We are sincerely grateful to their fullest support, guidance and advice.

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CLASS METAMORPHOSIS – FROM TRADITIONAL TO FLIPPED TO SELF-PACED LEARNING

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Highlights: Within the traditional learning environment, students might be left out unintentionally especially the struggling ones. The top students tend to get most of the attention in a lecture taught in a traditional model. Also, it is compulsory to cover specific contents in the courses and this requirement might hinder the implementation of active learning. With the access to the Internet, learning can be done outside of classroom. Our team changed the classroom setting to active and cooperative learning in our Numerical Methods and Optimization course. All instructional materials are made available in the UMP online platform known as KALAM as early as the first day of the new semester. Assessment schedule is also provided for the students to plan their learning activities. This approach drastically improves students’ attainment, not only in terms of grade but also their related soft-skills. Keywords: Flipped classroom, self-paced learning, active learning, classroom management

Introduction
Traditional learning environment is commonly found in any higher learning institutions. It can be regarded as a one-way learning session where students are passively involved and worked by themselves. Normally, collaboration is discouraged in this environment because the focus is given more towards the lecturers. Although it may encourage independent skill, students do not have the opportunity to collaborate with others student and that may affect their communication skill (Benware & Deci, 1984). For that reasons, active learning is highly encouraged as the platform for students to improve all the important soft skills before they enter the industries.

Many models have been presented in the literature for active learning and how to engage the students. However, no single accepted model has been established in the chemical engineering courses. That is apparent in the mathematical-based courses, including Numerical Methods & Optimization. This course is scheduled to be taken by the second-year students in the Faculty of Chemical & Natural Resources Engineering (FKKSA), Universiti Malaysia Pahang (UMP). The traditional learning environment of this course was transformed into a flipped classroom (FC) setting in 2012/2013 (Zainol & Samah, 2018). The term flipped classroom is commonly used for any class in which pre-recorded videos are used for learning activities. The magic in a flipped classroom is in the overall approach—the integration of videos with new applications of class time (Bergmann & Sams, 2012). The pre-recorded videos are combined in within-class activities alongside others integrated elements of technology. The learning environment for this course further evolved into a self-paced learning (SPL) session in 2018/2019. The execution of SPL does not differ much from that of FC—only the face-to-face contact time is reduced.

At the point of the transformation, mixed feedbacks were received and most inclined to the Delta side in a Plus-Delta feedback format. Nonetheless, the grades obtained by the students enrolled in this course — more than 98% passed with minimum B — reflect the success of the new learning environment because the role of the instructors of this course has changed from lecturing to facilitating and the attention has shifted to the students who need the most assistance, without ignoring the top students.

Acknowledgement
We are grateful for the opportunities and supports given by the Center for Academic Innovation & Competitiveness (CAIC), Centre of Instructional Resources & E-Learning (CIRel), and Faculty of Chemical & Natural Resources Engineering (FKKSA), UMP, in executing active learning approach in our course.

References
CATEGORISATION OF PEDAGOGICAL APPROACHES OF MALAYSIAN MOOCS

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**Highlights:** Massive Open Online Courses (MOOCs) has become an essential teaching and learning tool for Malaysian Higher Learning Institutions. The Ministry of Higher Education Malaysia aims to implement a blended learning model in 2025 where face-to-face classroom instruction is combined with computer-mediated learning. MOOCs plays an important role as the online learning tool incorporated. This study gathered both instructor’s and learner’s view of the current learning design embedded in Malaysian MOOCs and categorize 44 MOOC pedagogy. Their compatibility and influence will help to build and develop new courses and improve the old ones considering the most important stakeholder that is the learners.

**Keywords:** MOOC, Malaysia MOOC, Assessing MOOC Pedagogy, Online Pedagogy

**Introduction**

Learning in higher education has been made reachable for everyone with the Internet presence and accessing device through Massive Open Online Courses (MOOCs). MOOCs are growingly becoming a popular method of teaching and learning in this past decade as it breaks boundaries of geography, time and infrastructure. People can learn from the best professionals breaking boundaries of geography, time and infrastructure. Ministry of Higher Education Malaysia plans to explore and establish a national e-learning platform to coordinate and organise content online. Launching MOOC in niche to Malaysian expertise, making online learning an integral component and establishing required cyber infrastructure are amongst the tasks to reach that goal. The first Malaysian MOOC was launched in September 2014. By 2017, more than 100 MOOCs are offered by Malaysian Higher Learning Institutions using OpenLearning platform. This study gives an overview of current practice by determining their pedagogical approaches using Assessing MOOC Pedagogy.

**Methodology**

The study adapts Assessing MOOC Pedagogy (AMP) instrument to a structured Likert-style questionnaire. AMP is used to categorise 13 accredited college courses in the US by distinct expert of the niche area. 10 dimensions were discussed from an original of 14 pedagogical dimensions from Reeves pedagogical dimension study of Computer-based Education (CBE). These dimensions include epistemology, pedagogical philosophy, underlying psychology, goal orientation, experiential value, teacher role, program flexibility, value of experience, motivation, accommodation of individual differences, learner control, user activity, cooperative learning and cultural sensitivity (Reeves, 1994).

Assessing MOOC Pedagogy was developed from Reeves online evaluation tool retaining 6 dimensions namely epistemology, role of teacher, focus of activities [original name experiential validity], cooperative learning, accommodation of individual differences and user role. Four new pedagogical dimensions were added which are structure, approach to content, feedback and activities/assessments. The 10 pedagogical dimensions have two approaches where one side are of opposite characteristics to the other. Together with AMP, the questionnaire comprises of two sections (demographic and pedagogy). Demographic questions total up to seven questions. The initial Assessing MOOC Pedagogy tool is only a table of criteria and characteristics whereby the writer observes and mark based upon what they see from the MOOC and understand. This research adapts the tool to a 5-likert questionnaire totaling up to 36 questions.

A back-to-back translation was also carried out to ensure that the words used have the meaning it is intended to give. A pilot test was conducted to obtain expert opinion about the developed questionnaire. All experts include MOOCs instructors of different institution and a Bahasa Malaysia language coordinator. The study approached all active Malaysia Massive Open Online Courses with more than 50 participations within the time (September 2015 – February 2017). A questionnaire was sent to the instructor with the highest kudos received via the OpenLearning platform and university email address. A similar questionnaire focusing on students were distributed to students through OpenLearning platform and individual Facebook pages that matches their profile in OpenLearning. Participants were reminded from time to time through an email blast and call.
Statistical Package for Social Sciences was used to analyse the responses retrieved from the participants. This calculate the demographic analysis. Only paired responses were then proceeded for further analysis as both views are needed for a comparison. Descriptive and inferential analysis were done once the calculated value is mapped on the Assessing MOOC Pedagogy Table. Validity of this study is ensured through the note given below questionnaires that contains explanation on terms and criteria that uses pedagogical jargons. This tool has already been used to analyse 17 accredited MOOCs in the States.

Findings
A total of 44 MOOCs with complete respondent pairs were further discussed. They made up a significant number of MOOCs from 16 out of 20 respective public universities. The figure below shows the overall analysis of each criterion in AMP for the 44 MOOCs analysed. Generally, the outcome shows a strong alignment between MOOC’s instructors and student’s views on most pedagogical approaches except support of individual differences, type of examples use in activities and assessments as well as user role. The MOOCs has a constructivist epistemology, student- centred teacher role and a mix of convergent and divergent focus of activities. The approach to contents are slightly abstract. Students believed that the MOOCs supports individual differences on average, uses both artificial and authentic examples throughout activities and assessments and encourage both passive and generative role for users. Instructors however, believed the MOOCs to be slightly supporting of individual differences, uses more authentic examples than artificial examples in activities and assessments and encourage slightly more generative role for users.

Malaysian MOOCs are on the right track behind the philosophy (epistemology – constructivist) and teacher role (student centered). The nature of knowledge and how it is embodied should encourage learners’ thoughts and outputs. The pedagogy should inspire learning by doing. Additional attention in the structure, feedback and cooperative learning integration as it needs to be more structured, give frequent and constructive feedback and integrate cooperative learning. Extra focus should be put upon support for individual differences support and encouraging a generative role.

![Overall Summary of Malaysia MOOCs Pedagogical Approaches](image)

Figure 1: Overall Summary of Malaysia MOOCs Pedagogical Approaches

Acknowledgements
Well wishes to Allahyarhamah AP Dr. Norazila Abd Aziz for her guidance and love. Deepest appreciation to Professor Swan and team from University of Illinois, Springfield for allowing the adaptation of the tool for this study as well as MyBrain15 and Zamalah UNIMAS for the sponsorship. To Rosmila Senik, Mohd Taib Pardi, Raihan, Kauthar, Jannah, Asna, Husna, Safuhah, Alfiah, Hajar and everyone who believed and make it happened, I thank you all.

References
THE APPLICATION OF “SHARESTART” TEACHING METHOD IN MANDARIN AS A FOREIGN LANGUAGE CLASSROOM

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Highlights:
The paper reports a study on the application of “Sharestart” teaching method in a Mandarin as a foreign language classroom at Universiti Malaysia Sarawak (UNIMAS). The participants were students who enrolled in the UNIMAS elementary and intermediate Mandarin as a foreign language (MFL)’s class. Materials were mainly collected via observation videos and photos during classes, and student’s feedback. Students generally had been given positive feedbacks. As there were more activities and interactions in the classroom, the teaching method has promoted active learning among students, activated student’s self-learning mechanisms and the teacher can utilize the teaching time efficiently.

Keywords: Mandarin as a Foreign Language, sharestart teaching method, flipped classroom, student-centred learning

Introduction
Mandarin language is a tonal language. Even with the help of “pinyin” (a Mandarin pronunciation system), it is still difficult to pronounce the correct pronunciations and tones. Moreover, the syntax in Mandarin language is so different from Malay language and English language.

In order to build students’ confidence in learning Mandarin language, the application of “Sharestart” teaching method is to inspire students to see the relevance of what they have learned, to promote active learning among students, to activate student’s self-learning mechanisms. and at the same time the teacher can utilize the teaching time efficiently.

The “Sharestart” teaching method can enable students to self-learn, read, think, discuss and present in every class session. Students can gain new knowledge after attending classes and they are able to apply the knowledge in their real life situations. Based on the students’ feedback this is proven to be useful and a meaningful learning experience.

Description of innovation.
I am using “Sharestart” teaching method in teaching Mandarin as a foreign language. “Sharestart” is a flipped classroom teaching methods that comprehensively assists students to self-learn, read, think, discuss and express. In this teaching method, 5 important steps are included in the teaching and learning process (Please refer to the figure 1). First, students self-learn the content based on the teacher’s guidance. Secondly, students need to think and find answer based on the designed questions in their learning sheet. Thirdly, group discussions are held. After that, it is followed by students’ presentation on their findings in front of their peers. Lastly, the teacher summaries the lesson.

Figure 1: 5 important steps in “Sharestart” teaching method

For example, when I am teaching lesson 7 Daily routines and activities in Mandarin level 1, I start with pronouncing the vocabulary and moving on to sentence structure (grammar). This is to let students learn the new vocabulary and new sentence structures. Then, I divide the students into groups to translate the dialogues on p.37 in their textbook. After 15-20 minutes, I randomly select students to read and tell the meaning of the dialogue to check if the students are able to apply the new vocabulary and new sentence structure.
In order to check if students are able to rearrange the following characters or words to form a grammatically correct sentence, I inform the students that they are given a task. Students are asked to work in a group of 5. Each group has verb card, time expression card and noun card separately. The students need to form two sentences based on the cards. Whichever group that finishes first has to type the sentences in Padlet that is provided in eleap UNIMAS or write on whiteboard when there is Internet connection problem. 15 minutes is given for each group. When the time is up, students are asked to present what they have been typed in the Padlet. Before the class ended, I summarise the lesson and relate what is learnt to applications in real life.

The context or background of the innovation
Hui-cheng Chang from Taiwan is the founder of the “Sharestart” teaching method. I have learned this teaching method from Mr. Chang Facebook page, “Sharestart Teachers Public Group” and attended a “Sharestart” teaching method workshop. I apply the “Sharestart” teaching method in Mandarin as a foreign language classroom at Universiti Malaysia Sarawak (UNIMAS). The participants were the students who enrolled in the UNIMAS elementary and intermediate Mandarin as a foreign language (MFL) class.

The importance of the “Sharestart” teaching method to education
Our students, the learners have changed from those of the earlier generations in terms of reading and learning habits nowadays. Students lose their attention very quickly and they always need to be motivated and engaged. We are in Industry 4.0 today, therefore it is very crucial to prepare our students to this uncertain future. Since grades seems to be failed as a motivation factor for the students to learn, “Sharestart” teaching method is an approach to be introduced in education 4.0 as it covers all the essential elements in learning pyramid such as teaching others, practice doing, discussion, demonstration, audio-visual, reading and lecture. It also can promote active learning among students, activate student’s self-learning mechanism and the teacher can utilize the teaching time efficiently.

At the same time, the most important skills required for 21st century education such as critical thinking, communication, collaboration, and creativity can incorporate well in the “Sharestart” teaching method too. Thus, students can brainstorm their ideas creatively. Besides, students are required to complete a quest with collaboration embedded in every step of the way and teach each other how to complete a task.

Advantages of the “Sharestart” teaching method towards education and community
By applying “Sharestart” teaching method in Mandarin as a foreign language classroom, the teacher can utilise the teaching time efficiently. Teacher prepares students’ learning sheet and all the reading materials before class. Before the self-learning session, teacher only need to explain some important guidelines. During students’ self-learning session, teacher can be more focus on those students who are weak and facilitate them accordingly. At the same time, students who can self-learn better and faster can assist those students who are slightly weak in answering the learning sheet.

In “Sharestart” classroom, students can get the chance to shine by doing tasks which are not possible in the traditional grading system. The students feel competitive and push themselves a bit harder by thinking and finding answer based on the designed questions in their learning sheet. Students can increase their motivation, create positive competition, more joyful and hence, increase their performance in the learning process. At the same time, it helps in activating student’s self-learning mechanisms as the learning progress should go beyond classroom. Besides, I am integrating some technology in my “Sharestart” classroom. Other than eleap UNIMAS, Padlet and Quizizz, I also use Youtube to ask students to self-learn. For example, the Mandarin pronunciation, I divide students into groups and self-learn to practice how to sing a selected Chinese song from Youtube. They need to sing the selected Chinese song for me to check their Mandarin pronunciation. In this case, after students learn one song, they can easily pick up others Chinese song since they are able to self-learn using the resources that I have recommended to them. This indirectly can inspire the students to learn independently and good for their life-long learning.

For the students’ positive feedbacks which I have collected using eleap UNIMAS, photos and videos showing all the activities that I have done in my “Sharestart” classroom please find its at this link: https://drive.google.com/drive/folders/1LCCbcn7DbKSmai46Vx8c1iS2ye9Bf6ja9usp=sharing
Commercial value in terms of marketability or profitability of innovation

Some tasks that I have given to students in my “Sharestart” classroom can be commercialized. For example, the verb card, time expression card and noun card can be turned into a language game product to assist adults and kids in learning the correct grammar in Mandarin language. Besides, the getting to know you BINGO activity can be redesigned and become a great and fun language game for adults and kids who are interested in learning Mandarin in a fun way.

References


DESIGNING SPACE PLAY AN EDUCATIONAL MOBILE GAME PROTOTYPE FOR UNDERGRADUATE FORMATIVE LEARNING ASSESSMENT TOOLS

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Highlights: We designed a digital game using Participation Design (PD) technique. We started with student’s survey that serves as purposive sampling, and later made an invitation for the selected students. They attended the design workshop that we organized together with the game designer. Interestingly, students with zero knowledge on game design were able to design the game using the PD technique and tailored with fun elements of game. The game was then created based on the workshop results, and later was tested with the first year Diploma students from UTMSPACE Kuala Lumpur. Some new traits was found during the testing and improvised later.

Keywords: Educational Mobile Game, Fun Elements, and Game Design.

Introduction
For decades, online learning and teaching gives positive impact on students and teachers’ performance in education industry. Education is now heading towards Fourth Industrial Revolution. Many factors need to be studied to determine what makes a game fun and enjoyable. Thus, in the midst of research and innovation efforts made by Higher Education, we focused this short evaluation scope for diploma courses in UTMSPACE education center. Towards the Industrial Revolution 4.0, while UTMSPACE applying professional and continuing education as their logo, there’s also a need of technology and innovation in their learning and teaching activities. Besides, vision and mission, competition with other education center is also need to be considered in delivering education content to students. Facilities, environment, lecturers and even education content are also needed to be competitive. Delivering education content using suitable technology such as e-learning since decades was seen one of the effort towards industrial revolution.

Equipped with new technology and classroom facilities, students and teachers have their own perception on the suitability and other choices of online learning such as educational mobile game besides of e-learning (Sarmento, Gomes, & Moreira, 2018). Educational mobile game, such as online game available in the market can be accessed on open online platform and recently been used in some courses. Some students have gone through the experience with educational mobile game in the classroom, and they are pleased with the results and looking forward for the similar activity in the next class. We then, decided to design a SPACE PLAY, where the game shares almost similar strategy to Kahoot! Game, however with different design considering the student’s ability (color blindness) over the technology device. Therefore, a preliminary investigation was done on Diploma Computer Science Courses students from UTMSPACE Education Center in Kuala Lumpur.

DESCRIPTION OF SPACE PLAY GAME: SPACE PLAY Game is an online educational game that was design for lecturer and undergraduate students of PPD UTMSPACE KL. SPACE PLAY Game can be operated on computer or mobile phone device platform. Lecturer can create short brief quizzes to fulfill 5 minutes break for students to gain their momentum during learning in the classroom. It was design to be operated on smart phone as well due to student’s preferences.

BACKGROUND OF SPACE PLAY GAME: The SPACE PLAY Game is initiated to be one of the formative assessment learning tools. Applying the emotional dimension that is also known as aesthetics in a game (Hunicke, LeBlanc, & Zubek, 2004), the SPACE PLAY Game will create interesting game for learning. Agreeing with this, Obrist, Förster, Wurhofer, Tscheligi, & Hofstätter, (2011) mentioned that the mistakes in the existing game design nowadays lie on the heavy educational content rather than taking into account the gameplay features. In order to help the users on the educational game design features, participatory design (PD) technique was seen as a prominent technique (Benton, Vasalou, Khaled. Johnson, & Gooch, 2014) in gathers all the ideas and features of the user’s need. Therefore, in designing the game, we use Participatory Design (PD) technique that can guide in designing the future of educational mobile game anticipated by the diploma course students. With PD technique adopted (Ismail & Ibrahim, 2017),
students and lecturers can collaborate in designing the game, and understand to what extent that the educational mobile game can be tailored with learning and fun elements.

**IMPORTANCE IN EDUCATION:** Fun elements are crucial in game design and how they indirectly increase students’ learning motivation especially in the classroom. Besides increase the learning motivation, the engagement of students towards learning during class hour is important to make sure they are not losing focus on the topic. In some cases, students may focus at the early period of the class, but may divert their attention in the middle of the lecture. To get back their attention, the educational mobile game is used to make the students stay alert and to assess their focus during the lecture. During the designing phase, few students expressed that they have colorblind disability. Hence, we enhance the game to comply with the student’s request.

**ADVANTAGES TOWARDS EDUCATION & COMMUNITY:** There are many technique of formative assessment that can be used for the student’s assessment tools. Dedicated for the classroom teaching and learning process, a quick short question for students can keep them alert. However, only a few students are courageous enough to give the feedback. The SPACE PLAY Game creates a simultaneous respond from the students. The whole classes can answer the quizzes in the game using mobile phone, laptop or personal computer in the computer lab at one time.

<table>
<thead>
<tr>
<th>The Aesthetics of SPACE PLAY Game Preferred During Testing in the Classroom (n=50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative (Game Sequence)</td>
<td>88</td>
</tr>
<tr>
<td>Fantasy (Illustration)</td>
<td>84</td>
</tr>
<tr>
<td>Challenge (Competition &amp; Countdown)</td>
<td>86</td>
</tr>
<tr>
<td>Sensation (Music &amp; Touch)</td>
<td>62</td>
</tr>
<tr>
<td>Expression (Reward Display &amp; Sound)</td>
<td>88</td>
</tr>
<tr>
<td>Discovery (Game Content)</td>
<td>78</td>
</tr>
<tr>
<td>Fellowship (Sharing &amp; Converse with Friends)</td>
<td>74</td>
</tr>
<tr>
<td>Submission (Accumulation of Point Overtime)</td>
<td>74</td>
</tr>
</tbody>
</table>

**COMMERCIAL VALUE ADDED:** SPACE PLAY Game is following the trend of any online quizzes game available abroad, however the uniqueness is that this game was designed together with lecturers, students and game developer. Towards enhancement of student’s learning experience in the classroom together with digital game as a platform, the education environment will be much more interesting. The uniqueness of brief educational game as a formative assessment in the classroom creates good experience for students. With the words of mouth of student’s good learning experience, these students will get other students to enroll in the program.

**Acknowledgement**

We are grateful for Program Perdana Diploma (PPD) for their understanding on this research works and to the Department of Online Learning (BPAT) for sponsoring our paper for the IUCE2019 competition. We also would like to thank the game designer and our game unit tester: 1) Lau Zhao Lin, 2) Ng Qing Xian, 3) Nur Amira Afiqah Mohd Nazli, 4) Nur Amira Alfiqah Mohd Nazli, 5) Nur Nazurah Md Kamalullai, 6) Muhammad Hafiz Ahmad Souopian, 7) Muhammad Asyraf Shahrani, and also to user testers comprises of Year 2 2019, Class Section 42 & 43 and Year 3 Student’s 2019, Class Section 39 of Science Computer PPD UTMSPACE KL Malaysia.

**References**


SKRCTF: A CAPTURE-THE-FLAG PLATFORM FOR BEGINNERS IN LEARNING CYBERSECURITY

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Highlights: A safe and controlled environment is created for cybersecurity students to exhibit their hacking and forensics skills. By embedding gamification element, students are guided with different levels in their journey of becoming a security professional. Students and assessors will be given a detailed analysis that covers on individual performance level, area of expertise and areas for improvement. Without forgetting rewards, students are given badges upon reaching checkpoints, and the fastest solvers are rewarded in the hall of fame list.

Keywords: Capture the Flag, Game Based Learning, Cybersecurity Education, Score Analysis, Evidence Based Assessment, Independent Learning, Experiential Learning.

Introduction
Catching up cybersecurity skills and knowledge is never easy for learners. Malaysia is adopting cybersecurity education framework from countries with different landscape, such as National Initiative for Cybersecurity Education (NICE) in the United States (Newhouse, Keith, Scribner & Witte, 2016) and ACM’s Cybersecurity Curricula 2017 (Burley et al., 2017). This leads to a big gap between fresh graduates and industry professionals in Malaysia workforce. By studying the gap between Malaysia Education Blueprint 2015-2025 and the mentioned education frameworks, there is a need of an ecosystem for Malaysian students to obtain cybersecurity knowledge and skills. Technical skills such as testing vulnerabilities, analyzing malware, and performing reconnaissance are vital for a professional before advancing to a managerial position where designing security policies and auditing compliances are playing a more important role. This proposed design is taking a cybersecurity assessment tool as an instance to study learner’s performance in learning cybersecurity technical skills. This design is blending Game Based Learning (GBL) elements into a modified a Capture the Flag (CTF) game platform. A constructive alignment (CA) is carried out to maps CTF challenges difficulty with the syllabus. A generic E-learning platform suffers limitation in simulating cybersecurity landscape and assessing a learner’s skill performance. CTF is common among professionals where they use it as a platform to exhibit their skills, but most of them are not designed for university programs and the learning curve is too high for fresh graduates.

Description of innovation
Capture the Flag (CTF) competitions are controlled virtual environments simulating the real cyber landscape. Participants compete to perform and defend cyberattacks to gain points. Every successful attempt will be rewarded with flag that carries points. The team with the highest submitted points in the shortest time wins the competition. There are several studies on adopting CTFs in education systems in the United States but not in Malaysia (McDaniel, Talvi & Hay, 2016).

In the effort of meeting industrial expectations, beginners suffer high learning curve in obtaining cybersecurity skills and knowledge (Taylor, Arias, Klopchic, Matarazzo & Dube, 2017). Insufficient experience in subject domain could not assist beginners in choosing suitable trainings. Cybersecurity students are aware of cybersecurity topics but require hands-on activities to dive deeper into handling threats and vulnerabilities. With the aid of constructive alignment (CA) and input from academics and professionals, SKRCTF promotes an ecosystem where challenge creator could set the security challenges at the suitable level and students are tested at appropriate expectation level.

Organizing a CTF competition is resource straining. Organizers need to consider IT infrastructure, operating costs, subject domain, rewards and logistics matters. Hence, most of the CTFs are organized in a short period of twelve hours to a few days. In order to incorporate into university semester that lasts for months, modification is needed for this design. The CTF is divided into 3 categories: Beginner, Intermediate and Advanced. Academics oversee challenge difficulty level; while industry experts can review the proposed challenges. Prior to the involvement of experts, learners...
as the focus in this system should be appropriately guided. The platform will be notifying learners’ achievements and guides in the effort of supporting personalized learning. Both assessor and learners can review personal statistics. Besides, by reviewing the personal statistics, employers have the chance to identify the potential experts in specific domain. Human resource department is not in the best position to test cybersecurity job seeker in interviews, but the detail statistics obtained from the SRKCTF could act as a reference in the hiring process.

CTF platform has wide ranges of features. Besides focusing on scoring system, Game Based Learning (GBL) elements able to motivate learners. Learners can trade points for challenge hints, collect badges for passing levels, challenge other opponents and enter hall of fame for first solver.

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

Constructive Alignment (CA) is useful for outcome-based teaching (Biggs, 1999). Teaching activities are designed after the intended learning outcomes (ILO) are defined. Common E-learning platform has limitation to provide a simulated cyber threat landscape and assess learners. Malaysia tertiary level education is following the standard set by Malaysian Qualifications Agency (MQA) (Malaysia Qualification Accreditation, 2015). CA fits into MQA’s requirements provided teachers and assessors can align teaching/learning activities (TLA) and assessment tasks (AT) to the Program Standards. A sample rubric below maps student tasks and their performance level to an undergraduate level course: Introduction to Security.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Subgrades</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A, A+, A</td>
<td>Applicable and appropriate technique used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adopt comprehensive, pragmatic and honest approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evidence of suggestion or counteract any possible solution</td>
</tr>
<tr>
<td>B</td>
<td>B, B+, B</td>
<td>Appropriate technique used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adopt systematic and practical approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evidence of integrating solutions for the given challenge in a cohesive manner</td>
</tr>
<tr>
<td>C</td>
<td>C, C+, C</td>
<td>Rational technique used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adopt conservative and empirical approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evidence of providing conventional solution but lack of comprehensive reasoning</td>
</tr>
<tr>
<td>D</td>
<td>D, D+, D</td>
<td>Inappropriate technique used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adopt random approach to troubleshoot challenges</td>
</tr>
<tr>
<td>F</td>
<td>F, F+, F</td>
<td>Irrelevant technique used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No evidence of adopting any approaches</td>
</tr>
</tbody>
</table>

Table 1.0 Constructive Alignment rubric

**Why are they important to education?**

Without the support of an education framework for cybersecurity, Malaysian students are only exposed to formal Information Communication Technology (ICT) courses during their tertiary education. In the fast-evolving cybersecurity landscape, students will receive inconsistent knowledge and skills without a cybersecurity education framework. Compared to several countries implementing K12 education systems where cybersecurity concepts are introduced at elementary level (Cyber STEM Academy, 2015), Malaysian students require to speed up their learning in both ICT skill and specialized cybersecurity topics within their university term.

The challenge of gaining cybersecurity technical skills got tougher when Malaysia’s world ranking in mathematics and science standards had increased but fell below the middle point of scale in Trends in International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA) (Ministry of Education Malaysia, 2016; Provasnik, et al., 2016). This is a vital issue as cybersecurity topics not only covering programming logics but also computational thinking and troubleshooting skills. An ISACA’s studies (2015) found that there is a significant lack of trained security experts, which will result in a shortfall of as many as 1.5 million workers by 2020, according to Frost & Sullivan and the International Information Systems Security Certification Consortium (ISC)² (Lee & Rotoloni, 2015). Despite the investment was flowed in with conferences and workshops to increase the awareness, a constant upgrade in cybersecurity learners is needed to sustain the movement of defending cyber threats. CloudPassage (2016) study found that none of the top 10 U.S. computer science programs require a cybersecurity course for graduation. In fact, three of the top 10 university programs do not even offer an elective course in cybersecurity (Peterson, 2016). This statement was supported by Wolff, where she finds the scope of cybersecurity landscape is vast and is distinctive from most of the profession that has uniform of expectations (Wolff, 2016).
Commercial Value
SKRCTF aims to create an ecosystem where several parties not limiting to benefit learners and assessors. Developers can commercialize the mentioned modules and extend to learners and assessors. Modules such as detail report breakdown and suggestions, flag sharing prevention module, and challenge levelling can be included for developer’s incentive. Content developer can also design guides and walkthrough in such to be subscribed by learners. Recruitment firms can also purchase potential candidate’s profile that suits their business need.

SKRCTF is not limited to cybersecurity courses. Any troubleshooting related courses such as mathematics and engineering can adopt the similar approach. Researchers can further expand the scope by embedding graphical elements and storyboard to increase the learners’ engagement.

Acknowledgement
This study has been supported financially and technically by KDU University College and Sultan Idris Education. The researcher would like to extend the gratitude to all the parties that participated in this study.

References
CATS INNOVATIVE MODEL APPLICATIONS IN BLENDED LEARNING FOR SOCIAL SCIENCE STUDENTS

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Highlights
The project is designed to meet the needs of the present-day generation who are technology-oriented in terms of their preferences of the learning methods. This project is specially created for the first year students who take the Introduction to Social Science's course. This course is often regarded by some students as “dry” and boring because it involves a lot of reading materials, long and solid lecture notes and a lecture-based course. Therefore, as a lecturer who taught this course, I took the approach to make this course interesting to change the student’s impression towards the course. Hence from traditional approaches, I have changed to e-learning approach utilizing the CATS Innovative Model application in blended learning using eLEAP UNIMAS online platform. Through this project the students are involved in various activities to be able to produce 5Cs (creative, competitive, competent, confident students and able to produce critical ideas) students. The main approach used is 30% of online learning through the eLEAP, and another 70% is through innovative approaches using CATS Model.

Keywords: Social Science, e-learning, CATS Innovative Model, eLEAP online platform

Introduction
The learning strategy for this project is 30% through online learning using the eLEAP platforms, and another 70% is through innovative approaches using CATS Model. The use of eLEAP includes lecture notes, journals, videos and others activity such as tutorials, quizzes and forums that can be done online. While innovative learning based on CATS Model involves 70% of the total student activity (active participation of students including technology applications in learning) that includes gamification, peer learning, case-based learning, forum, acting, kahoot, flipgrid, Wix.com, padlet etcetera. At the same time, student engagement will be recorded and transferred into the eLEAP platform as a reference and proof of student engagement in the classroom, thus facilitating the scoring/awarding method for student’s performance.

Objective:
Produce an innovative e-learning method, active involvement of students, and the use of technology that is relevant to the current learning scenario

Learning Strategy: CATS Innovative Model

![Strategi Pembelajaran](image)

Project Benefits (Education and Community):

Some potential benefits of this project for education and community are:
To change the role of teachers and students; to provide a public access for material content and interactive information through the network; to overcome the constraints of time and space in the learning environment; to reinforce the organization and learning management, and to create collaboration between teachers and students. Realizing knowledge-based society, several actions need to be conducted, such as ensuring that everyone had e-learning competencies and developed the other key competencies through ICT to participating in the community; setting the learning goals for the emancipation and empowerment as well as improving ICT literacy as part of the continuous lifelong learning.

The internalization process of e-learning can be transformed by promoting cultural activities in the school environment through the integration of educational values in the learning materials, thus, habituation, assignment, and role modelling being integral and holistic, which was continuously being part of learning, understanding, practicing in the daily life.

Project Impact (To Students): 5Cs (creative, competitive, competent, confident students and able to produce critical ideas)

Cognitive: Through face-to-face and online innovative approaches, students are given a variety of new exposure through activities that are given individually or collectively.

Psychomotor: This course gives students the opportunity to use their skills in technology to find information related to the course as well as to complete the assignment given.

Affective: The use of eLEAP and active involvement of students in the classroom can attract students, hence they feel that the course is interesting, meet their needs and not boring.

Commercial Value:
New Innovative Model of Educational Institutions.

Acknowledgment
The author would like to thank the Dean, Faculty and FSSK students for their cooperation and involvement this project.
DElivering an On-Campus Course Fully Via a Mooc: Satisfying and Dissatisfying Aspects

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Highlights:
This study reveals the MOOC learners’ satisfaction and dissatisfaction towards their involvement in an on-campus course that was delivered fully via MOOC. The specific satisfaction and dissatisfaction aspects are discovered via Critical Incident Technique (CIT) and comprehensively covered all the eight-dimensions of the e-learning framework proposed by Badrul Khan. This framework includes the pedagogical, technological, interface, evaluation, management, resource support, ethical and institutional dimensions.

Introduction
Massive Open Online Courses or MOOCs are online courses that afford a huge number of participants and can be openly accessed via the web. In Semester 1, 2018/2019 UNIMAS had employed fully online learning for ICT Competency course via MOOC. ICT Competency is a compulsory course offered to all first-year students and is the first course in UNIMAS which is delivered fully online, replacing the blended mode of delivery.

Content
As the implementation of such learning delivery is new, a study was conducted to explore learners’ satisfaction and dissatisfaction towards ICT Competency MOOC via the Critical Incident Technique (CIT). CIT is a well-established qualitative method as it is designed to study vital experiences or important constituents of events which can assist researchers to gather and determine the resulting behaviours.

Past studies have revealed some satisfying and dissatisfying aspects of e-Learning. Lin et al. (2005) found that satisfaction is affected by the pedagogy of a course. The pedagogical dimension such as the course design and content as well as consideration towards learners’ requirement and learning goals influence their satisfaction. Effective multimedia content such as the visual, written and animated content materials also give positive impact on learners’ satisfaction towards MOOC (Liu et al., 2009). On the other hand, Hanan and Martin (2015) revealed that 35% of learners have a low level of satisfaction towards MOOC. They were dissatisfied due to the lack of instructor’s interaction such as no reply to posts or emails and absence of announcements from instructor until the second or third week of a semester. Learners were also dissatisfied with the lack of guidance and technical assistance as well as unstructured online discussions.

Unlike most of past studies, this study examines learners’ satisfaction and dissatisfaction by covering all the crucial dimensions of e-Learning. Their satisfaction and dissatisfaction aspects were categorised based on the eight-dimensional of e-learning framework proposed by Badrul Khan which are pedagogical, technological, interface, evaluation, management, resource support, ethical and institutional (Khan, 2001, 2005). In-depth qualitative data on learners’ satisfaction and dissatisfaction was obtained by interviewing the learners, who took ICT Competency during Semester 1, 2018/2019.

The findings show that most informants are satisfied with the technological, pedagogical, evaluation and interface dimensions of ICT Competency MOOC. However, informants are dissatisfied with some other aspects of the pedagogical, ethical, engagement with lecturer and management dimensions of ICT Competency MOOC.

Such findings provide insights to MOOC designers and instructors on how to further improve the MOOC design and delivery as satisfying MOOC will strengthen and sustain learners’ engagement with the MOOC. Indeed, such sustained engagement is absolutely crucial when a course is fully delivered via MOOC.

Acknowledgement
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References
RUBRIC-BASED ONLINE ASSIGNMENT GRADING

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Highlights: Rubric is a scoring tool that explicitly represents the performance expectations for an assignment or task. It can be used to measure the students learning and their achievements, and improve the educational system. This paper presents an online grading rubric that was developed to collect, process, and return the marks obtained by a student in course. Four steps involved in the rubric development. Firstly, the instructor decides the type of rubric that need to be used for the evaluation (holistic or analytic). Secondly, the instructor determines the evaluation criteria. Thirdly, determine the number of performance levels that will be used in the evaluation. Lastly, provide the descriptions for each performance level. Once the rubric is created, it is attached with a specific assignment for the purpose of evaluation. This paper will show an online grading rubric with respect to the effectiveness in assignment grading and assessment of student learning performance.

Keywords: rubric, online assignment, online grading, student performance

Introduction
Grading of assignment often being done in traditional manner which involves the instructors assign certain marks to certain questions or tasks. Usually they use a set of answer scheme as a guide for marking. The grading for student's assignment or task is done based on how closely students' answer matches the points given in the answer scheme. Grading feedback is in the form numerical marks and written comments on the student assignment. Another approach for grading is to use rubrics. Rubrics is a standard of performance requirement in the form of assignment evaluation criteria to assess specific learning outcomes (Isbell & Goomas, 2014). The instructors will develop the evaluation criteria in advance for the assignment or task that need to be graded. For each criterion, various levels of achievement with description is stated. This gives guidelines to the instructor to assess the assignment or task based on requirements for each level of achievement of each criterion. The levels of achievement in each criterion will be assign with marks or weightage which can be combined to produce overall score.

Several studies have been reported on rubric based online assignment grading in an LMS for providing transparency in assessing student learning outcome (Allen, 2014) and enhancing their performance (Chowdhury, 2018). These studies have been conducted in various areas including management, health management and education. However, there are little studies on rubric used in task-based assignments. Thus, this study examines the use of online grading rubrics in UiTM Learning Management System to compare the student’s expected performance in multimedia application development for each evaluation criteria of the task to the student's level of achievement. Analysis on each evaluation criteria of the task is performed to determine the student’s performance in multimedia application development. Based on the analysis, the instructor able to direct the student’s learning activities to meet the task requirements in the form of rubrics.

Context
This study was conducted at University Teknologi MARA (UiTM) for Interactive Multimedia course for distance learning students. It was conducted in Semester May 2019 and 18 students were registered for the course. The lectures were conducted online whereas task was conducted in face-to-face session. The subject assessment consists of 2 online quizzes, 2 online tests and 5 online assignments. The standard practice in previous semester is where the assignments were marked by instructors according to the marking scheme provided by the resource person. The marking scheme consists of basic evaluation criteria with marks. The instructors will grade the student’s assignment by total up the marks manually for each successfully completed task by the student.

Methodology
In this study, the individual assignment in Interactive Multimedia course was used as a sample. Task question and evaluation criteria for the individual assignment was written by the course instructor based on the required learning outcome. Then, the marking rubric for the assignment is constructed. Figure 1 shows how instructor creates the rubric for the individual assignment. This rubric was then attached with the task question for marking purpose.
Figure 1: Process for creating rubric

The task questions and its marking rubric was uploaded in assignment module in UiTM LMS. The students have to complete the task and upload their work online under assignment module. Once the instructor graded the assignment, analysis for each criterion will be performed and displayed in the rubric analysis report. The rubric analysis report was used to identify the overall students’ level of achievement for each criterion.

Result

The data set consists of a mark out of 30 for 18 samples of individual assignments from interactive multimedia course. The rubric analysis report was used for students’ overall achievement (actual score) for their expected performance (expected score). Figure 2 shows the generated rubric analysis report with minimum, maximum and average score for each criterion of the marking rubric for individual assignment.
Figure 2: Rubric analysis report

The results in Figure 2 shows the gap between the actual and expected score for each criterion. This gap will be useful for the instructor to identify student or area that need additional attention to meet the expected performance.

Conclusion
This study provides an understanding on how rubrics is embedded in UiTM LMS for online assignment grading. This rubric based grading will provide insights for students’ learning performance. This will encourage the instructors to focus on learning activities that require additional attention to enhance the learning outcomes.

References
DESIGN AND DEVELOPMENT OF PROTOTYPE MOBILE APPLICATION INTEGRATED WITH AUGMENTED REALITY TO ENHANCE STUDENT LEARNING EXPERIENCE

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Highlights: A prototype augmented reality integrated mobile application was designed and developed using a unity-vuforia platform to enhance the student learning experience. AR videos are triggered when scanned using the mobile application. The usability of the prototype mobile application was tested with 39 students [Diploma in Fisheries] and their learning experiences were measured through an online questionnaire [6 variables: 20 items]. The three highest rated variables were interdependence, engagement and interest, and affective feelings. Overall, the result showed positive responses indicating the enhancement of student learning experience. From this innovation, module can be published as a copyright document and mobile app as an intellectual property.

Keywords: Learning module, higher learning, Android, Unity, Vuforia

Introduction
Augmented Reality is a very efficient technology for both higher education such as universities and colleges. Students in both schools can improve their knowledge and skills, especially on complex theories or mechanisms of systems or machinery (Lee, 2012). Research showed that AR can make complicated mechanisms and difficult theories in higher education accepted and understood by students with contextually enriched interaction using AR technology (Liarokapis et al., 2014). It is highly likely that AR can make educational environments more productive, pleasurable, and interactive than ever before. AR has been affective for a better learning performance (53.13%), learning motivation (28.13%), student engagement (15.63%) and positive attitudes (12.50%) (Bacca et al., 2014). Augmented reality (AR) provides the opportunity for users to interact with computer-generated content from the real world. Educators and technical developers are also exploited the capabilities of AR technologies to enable new forms of learning in various subjects. In this paper, we analyze student’s first experience with prototype mobile application integrated with augmented reality.

Description of Innovation, Design and Development
The prototype course module was based on water quality experiment in the laboratory. The module focused on the analysis of water nutrient: nitrite. The prototype module was design with simple graphics, organized within a single page. The module is embedded with seven AR trigger images. The main objective to embed AR elements was to enhance the student learning experience. The mobile application tested to trigger AR content during this study was using HP-Reveal. Then the main mobile application intended was developed based on Unity-Vuforia platform. The mobile application has three main functions/menus: 1) AR camera 2) Access to laboratory module and 3) Information of educators (Figure 1).

Usability, Advantage and Marketability
The usability of the prototype mobile application was tested with 39 students [Diploma in Fisheries] from the course Water Quality and Soil Management, Semester 02 2018/2019, Diploma in Fisheries program offered at the Universiti Putra Malaysia Bintulu Campus. The students comprised of 41% male and 59 % female. The students’ age ranged from 18 to 21 years old with majority aged 19 (74.4%). All the students experienced AR for the first time. A 20 items questionnaire was designed to access the student’s first impression, learning experience and feedbacks on AR course module (Bacca et al., 2014; Dunleavy et al., 2009; Ibáñez et al., 2014). The questions were categorized into 6 variables: engagement and interest (5 questions), cognitive overload (4 questions), knowledge acquisition (3 questions), interdependence (2 questions), flow and processes (3 questions) and feelings (3 questions). Students answered the questions based on a 5-point Likert scale. Data was collected during a water quality laboratory experiment. An online google form (questionnaire) was filled by students at the end of the experiment after experiencing the augmented reality embedded mobile application and course module.

Overall, the result showed that 17/20 questions received positive responses and 24/28 written positive feedbacks; indicating the enhancement of student learning experience. The three highest rated variables were interdependence, engagement and interest and affective feelings (Table 1). The variable of interdependence...
showed that the innovation enhanced the communication and teamwork among students to solve problems. The students indicated that the experience using AR was engaging and improving interest, fun, effortless learning and highly preferable. Through the variable of affective feeling; students indicated that they felt rewarded, success and enjoyment after engagement with AR technology.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdependence</td>
<td>3.9672</td>
<td>39</td>
<td>0.9283</td>
</tr>
<tr>
<td>Engagement and Interest</td>
<td>3.9646</td>
<td>39</td>
<td>0.9385</td>
</tr>
<tr>
<td>Affective Feelings</td>
<td>3.9402</td>
<td>39</td>
<td>0.9141</td>
</tr>
<tr>
<td>Knowledge Acquisition</td>
<td>3.9231</td>
<td>39</td>
<td>0.8768</td>
</tr>
<tr>
<td>Flow and Processes</td>
<td>3.6638</td>
<td>39</td>
<td>0.7333</td>
</tr>
<tr>
<td>Cognitive Overload</td>
<td>2.9167</td>
<td>39</td>
<td>0.7441</td>
</tr>
</tbody>
</table>

Based on the findings of the six variables of learning experiences, it can be concluded that the used of AR was able to increase the engagement and interest, improve knowledge acquisition, interdependence, flow and processes, and feelings of the students. These findings were further supported by the personal comments and feedbacks expressed by individual students. From this innovation, module can be published as a copyright document, and mobile app as an intellectual property. The innovation can be further used as a training tool for the subject of water quality during training and workshop.

Acknowledgement
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References
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MYSOLAT

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Highlights:
MySolat is an interactive education mobile app designed to understand about Solat and how to perform the Fardh Solat. It is a comprehensive hands-on guide for believers to get themselves familiar with every aspect of daily prayers and in any conditions. The huetagogy theory and bitesize contents are designed and developed to fit the current need of learners. The multi-media of content are prepared in consideration of different learner styles. This innovation is a collaboration work of trans-discipline subject matter experts for the benefit of learners.

Keywords: Huetagogy, digital content, mobile apps, learning styles, interactive

Introduction
The increased usage of mobile devices such as handphones, iPad, smartphones, tablets and PDAs is a global trend. People carry these technologies to improve their daily activities particularly for communication and dissemination of information and knowledge. Similarly, the ‘anytime’ and ‘anyplace’ concept offered can be utilized in mobile learning to enrich the educational activities in conveying and retrieving lessons. Hence, we take this opportunity to have benefit and advantages it can offers.

Ubiquitous, collaboration and socializing are among the application features that made it as an interesting tool to have (Oyelere et al. 2018). Moreover, the application allows learning resources to be access comfortably.

Based on these features we designed and develop MySolat.

MySolat is a new invention of interactive application software for mobile devices which also known as mobile apps. It is an app for education purposes and specifically about Ibadah Solat. It contains many useful features and most importantly the multimedia content developed and designed for teaching and learning on how to perform solat. Our content focuses on Solat Fardhu and the Rukhsah (Sickness, Travellers and Disable-Hearing, Blind and Speaking). This app allows the dissemination of theoretical and practical content in a fun and meaningful ways. It offers multimedia content suitable for various learning styles (VARK) and also offers multi languages: currently Malay and English (coming soon Arabic).

Description of innovation
The innovation of this product can be divided into two main categories. First is the interactive application itself and the following is the digital contents.

The design and development of the app embrace the factors to develop mobile apps for Teaching and Learning (Alwi, et al 2019.)
The code for this app is developed and designed using native platform for both iOS and Android. The code focuses on the teaching and learning mobile app that allows multimedia content share by the users. In addition, this app allows interactivity to engage the users with the content.

The digital contents are developed using ADDIE and designed in bitesize that suits the busy life style of learner and offers the life-long learning and flexible education concept. The contents are designed in multiple media such as video, infographic and text-based to accommodate the need of VARK learning styles.

**Importance for Education**

This innovation is important for education as it offers the flexibility of learning with ubiquitous, collaborative and socializing features that made it as an interesting T&L tool to have. Most importantly the contents are designed and
developed with the consideration of different needs of learners in engaging with the content. The usage of SPEIM model where it maps the learning style with learning strategy and learning material.

**Advantages**

The platform suits the trends of 21st century and learners’ demand. It is aligned with the Education 4.0 concept. Besides, it also gives advantages in saving time, paperless environment and reduce the cost for printing and learning time. Useful app for patients, care taker, nurses and physicians as well. Easy access anytime and anywhere. Content developed and designed by the Subject Matter Experts.

**Commercial value**

This app is currently available to be downloaded at the Google play and apple store with minimal charge. It has a huge potential market to the hospitals that would like to help their patients that need to know how to solat when they are sick and the airline company for their passengers and travelers as well as disable people.

**Acknowledgement**

We would like to thank Universiti Sains Islam Malaysia (USIM) for funding this research under special grant PPP/KHAS_GIQ/FST/051007/12717. Special thanks to Pejabat Mufti Wilayah and Pejabat Mufti Negeri Sembilan for their contribution and supports to this project.

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GAMUDLEARN: INTEGRATING UNIVERSAL DESIGN FOR LEARNING (UDL) AND GAMIFICATION IN BLENDED LEARNING

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Highlights: The current innovation integrates a universal design for learning (UDL) and gamification into blended learning to create flexible and engaging learning environment that accommodates the diversity of both learners and educators. The inclusivity of such approach yields effective learning that can be applied in both technical and social sciences. The innovation is cost savings as it emphasizes on the design of the gamified activities rather than adopting expensive game or applications. Thus, it is low in cost (if any) and effective. The innovation is recyclable and scalable to cater different learning environments, educational curriculums and class sizes.

Keywords: Universal Design for Learning; UDL; Gamification; GamUDLearn; Blended Learning; Inclusitivity
Introduction
Blended learning utilizes online technology advances to share learning materials in order to spare extra face-to-face time for meaningful Teaching and Learning (T&L) activities. Gamification is one of the approaches that are often applied in blended learning. Without proper design, the outcome of gamified activities may favour dominant and outperforming students whereas passive learners’ participation is often perfunctory. Most educators use the pedagogical methods that they are comfortable with, overlooking students’ individual differences and needs. This hinders effective implementation of T&L. By integrating the Universal Design for Learning (UDL) and gamification, the current project introduces “GamUDLearn” approach to create flexible and engaging learning environment that accommodates the diversity of learners. The “GamUDLearn” provides diverse means of self-engagement, acquirement and expression of information. This allows students to find their own way of learning and develop intrinsic motivation to learn more. In the current project, our analysis showed that the “GamUDLearn” activities statistically positively affected students’ examination scores, social skills and psychomotor performances. Furthermore, students also developed proactive behaviour in the classes. It is demonstrated that students were able to apply the skills and techniques that they attained from the “GamUDLearn” activities in their examinations. The current project is versatile and applicable in any other courses.

Description of innovation
By integrating the Universal Design for Learning (UDL) and gamification, the current project introduces “GamUDLearn” approach blended learning to create flexible and engaging learning environment that accommodates the diversity of learners and educators. Such approach not only allows students to master their specific fields, but also master the learning process itself. This involves multiple ways of intrinsic self-engagement, presentation and representation of information, as well as expression of knowledge. The “GamUDLearn” project is an original idea that has long term and far-reaching impacts to students.

UDL covers three primary principles:
- Multiple means of engagement - to tap into learners’ interests, offer appropriate challenges, and increase motivation,
- Multiple means of representation - to provide diverse students’ options for acquiring information and knowledge,
- Multiple means of action and expression - to give students’ options for expressing what they know.

This flexible and tolerant learning environment allows students with individual differences to effectively master the knowledge of their respective fields. Throughout the UDL process, students realize that there are multiple means for self-engagement, presentation and representation of information, as well as expression of knowledge. Ultimately, the UDL supports students to become “expert learners” who are, in their own way, purposeful and motivated, resourceful and knowledgeable, and strategic and goal driven.

By convention, many educators assume T&L techniques fit for all students with different strengths and weaknesses. For instances, digital native generations respond differently to the e-learning in term of effectiveness. UDL is designed to accommodate the diversity of the students using neuroscientific findings. However, complexity in designing T&L activities in accordance to UDL might hinder educators from doing it. To kickstart the concept of UDL into tertiary curriculum, our team integrates gamification and UDL. With gamification, UDL becomes vivid and easily to be implemented. With UDL, gamified activities concern the diversity of students and become intrinsically motivating and purposeful.

Importance to Education
Most educators use the pedagogical methods that they are comfortable with, overlooking students’ individual difference and needs. This hinders effective implementation of Teaching and Learning (T&L). Some educators rely on conventional face-to-face teaching while others adopt web tools and/or games. With the absence of a proper guideline, gamification may only stimulate extrinsic motivation of students. In other words, without a proper T&L design, these techniques only suit certain types of students. Hence, a transformative approach is needed to allow students mastering the learning process itself in addition to their respective fields. This is why the concept of “GamUDLearn” is introduced to deal with all the problems.

The advantages of the project include:
- Cost savings – “GamUDLearn” emphasizes on the design of the gamified activities rather than adopting expensive game or applications. Thus, it is low in cost (if any) and effective.
• Efficiency – “GamUDLearn” are intrinsically engaging and foster the students in mastering the learning skills.

• Recycles – “GamUDLearn” aims to create flexible environment that accommodates the needs of different students, which is recyclable.

• Versatility – “GamUDLearn” is not exclusive to certain course or field, it is applicable to other courses.

• Sustainability – Summing all the aforementioned features, the current project is sustainable and practicable.

Commercial Values
The “GamUDLearn” project involves educators of different fields covering both technical and social sciences. A set of scientifically proven guidelines have been developed for “GamUDLearn” and its effectiveness has been tested in various courses. By implementing the project, the outputs of these respective courses are encouraging. This implies that the versatility of the “GamUDLearn” system and its potentials to be adopted in any other courses and fields. Trainings and modules can be developed and used by other institutions.

Acknowledgements
We sincerely thank the Centre for Academic Development (CADe), Universiti Putra Malaysia for recognizing our work. We are grateful for the support and assistance given by our colleagues and students from Universiti Putra Malaysia in making this project a success.
NOTA INTERAKTIF PENGATURCARAAN C MENGGUNAKAN AUGMENTED REALITY

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Abstrak: Asas Pengaturcaraan merupakan subjek teknikal yang wajib diambil oleh semua pelajar yang mengambil pengkhususan Sains Komputer. Pada masa kini golongan pendidik berusaha mencari penyelesaian untuk memastikan ilmu pengaturcaraan yang disampaikan dapat difahami dan diaplikasikan oleh pelajar. Nota Interaktif Pengaturcaraan C ini dihasilkan untuk membantu pendidik dalam menyampaikan ilmu pengaturcaraan dan sekaligus membantu pelajar memahami konsep asas pengaturcaraan. Nota ini diadakan kepada pelajar secara hardcopy. Di dalam nota ini disediakan penerangan tentang konsep pengaturcaraan. Selain itu, elemen Augmented Reality digunakan bagi memudahkan pelajar merujuk konsep pengaturcaraan dan cara menulis aturcara melalui video yang ditunjukkan apabila pelajar mengimbas gambar yang tertera perkataan 'Scan Me'. Diharapkan inovasi seperti ini dapat memudahkan para pelajar dan juga pendidik yang terlibat dalam bidang Pengaturcaraan.

Kata kunci: Kolej Komuniti, Bahasa Pengaturcaraan C, Augmented Reality, Nota Interaktif

Pengenalan
Pada masa kini, terdapat pelbagai cara untuk mempelajari subjek Asas Pengaturcaraan. Subjek ini merupakan subjek teknikal bagi pelajar yang mengambil bidang pengkomputeran. Asas Pengaturcaraan C merupakan salah satu subjek teknikal yang wajib diambil oleh pelajar Semester Satu (1) Sijil Teknologi Maklumat di Kolej Komuniti Mas Gading. Namun begitu, kaedah pembelajaran sedang ada iaitu menggunakan kaedah konvensional nota dalam bentuk slaid powerpoint didapati kurang membangunkan minda konvensional pelajar yang terlibat dalam subjek Asas Pengaturcaraan C. Nota dalam bentuk slaid powerpoint hanya dapat membantu pelajar secara teori namun tidak dapat memberi gambaran secara terus konsep-konsep yang terlibat dalam Asas Pengaturcaraan C. Walaupun pensyarah memberi tunjuk ajar satu-persatu di dalam kelas untuk menghasilkan kod aturcara yang terlibat dalam subjek Asas Pengaturcaraan C, namun masih terdapat pelajar yang tidak mampu untuk memahami dan mengikutinya.


Metodologi
Metodologi yang digunakan untuk membangunkan Nota Interaktif C menggunakan Augmented Reality adalah dengan menggunakan Software Development Life Cycle (SDLC). Berikut merupakan enam (6) fasa yang terlibat dalam SDLC iaitu:


Fasa Analisis Sistem ialah fasa untuk membuat analisis kelemahan dan masalah yang dihadapi dengan kaedah konvensional iaitu menggunakan slide powerpoint dalam menghasilkan nota bagi subjek Asas Pengaturcaraan C. Fasa ini juga akan menentukan penambahbaikan yang dibuat iaitu dengan menghasilkan Nota Interaktif menggunakan Augmented Reality. Bagi memperkuatkan lagi penghasilan Nota Interaktif menggunakan Augmented Reality pelbagai cara dibuat iaitu melalui termubual dengan pelajar yang akan menggunakan nota interaktif, mengendalikan borang saal selidik keberkesanan nota interaktif tersebut serta permerhatian di dalam kelas oleh penyarah semasa sesi pembelajaran dan pengajaran. Semua data tersebut dikumpul dan dinalisa menggunakan Carta Aliran Sistem bagi melihat pengoperasian sistem dari mula sehingga tamat.


Fasa Rekabentuk Sistem ialah fasa merekabentuk antaramuka sistem dengan menghasilkan lakaran papan cerita yang memperbaiki, menambah kekurangan atau kelemahan nota interaktif sebelum menghasilkan nota interaktif yang sebenar nanti.

Fasa Pembangunan dan Pengujian ialah fasa di mana proses menghasilkan nota Asas Pengaturcaraan C secara hardcopy yang mengandungi teks dan gambar tertera perkataan “Scan Me”. Selain itu juga, di fasa ini semua gambar dan video tutorial akan disimpan ke dalam laman web HP Reveal. Selain video akan dipindahkan dengan gambar yang sesuai. Setelah semua ini dijalankan iaitu dengan menggunakan HP Reveal semua gambar akan dimasukkan melalui telepon pintar sehingga video tutorial yang dipindahkan ladi berjaya dimainkan. Pelajar akan diberi tunjuk ajar bermula daripada memahami sehingga menginstalasi HP Reveal ke dalam telefon pintar mereka dan belajar cara menggunakan HP Reveal iaitu mengimbas gambar pada nota interaktif tersebut sehingga video tutorial berjaya dimainkan.

Fasa Pelaksanaan Sistem ialah fasa di mana Nota Interaktif C menggunakan Augmented Reality yang telah siap sepenuhnya akan diedarkan kepada pelajar Semester Satu (1) Sijil Teknologi Maklumat di Kolej Komuniti Mas Gading dalam bentuk hardcopy. Nota interaktif ini sudah boleh digunakan semasa pembelajaran dan pengajaran di dalam kelas.

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Fasa Penilaian dan Penyelenggaraan ialah fasa yang melibatkan penilaian berterusan hasil penggunaan nota interaktif ini supaya mencapai objektif penghasilannya. Dalam masa yang sama, aktiviti penyelenggaraan iaitu pengemaskinian nota interaktif akan dilakukan secara berterusan. Aktiviti pengemaskinian ini berlaku apabila terdapat permintaan daripada pelajar sebagai pengguna untuk menambah baik cara penulisan nota ataupun menyediakan video tutorial yang lebih mudah difahami. Bukan itu sahaja, iaitu atas permintaan institusi lain yang ingin penambahbaikan bukan sahaja menyediakan nota Bahasa pengaturcaraan C tetapi Bahasa pengaturcaraan yang lain sebagai contoh Java atauaup PHP.

Nota Interaktif C menggunakan Augmented Reality ini menggunakan persian pengimbas yang dikenali sebagai HP Reveal. Perisian HP Reveal ini menggunakan kaedah Augmented Reality yang mana gambar yang tertera perkataan "Scan Me" dlimbas bagi memainkan video tutorial. Kaedah Augmented Reality yang digunakan dalam nota interaktif ini akan menggantikan nota konvensional iaitu nota dalam bentuk powerpoint atau kaedah tunjuk cara di dalam kelas dalam sistem pendidikan pada masa kini.

Suasana pembelajaran dan pengajaran (pdp) di dalam kelas akan lebih menarik dan pelajar akan lebih banyak berinteraksi dengan pesyarahan mereka. Pada masa kini, semua pelajar memiliki telefon pintar dan mereka sangat aktif dengan gajet mereka untuk melayari Internet dan bermain permainan interaktif. Idea menggabungkan kaedah Augmented Reality dengan telefon pintar akan lebih menarik minat pelajar untuk belajar kerana mereka sememangnya sangat sinonim dengan telefon pintar ini. Sesi pembelajaran akan lebih berkesan dan pengajaran yang disampaikan akan lebih mudah.

**Kelebihan Dalam Pengajaran**

Kelebihan yang ada pada Nota Interaktif C menggunakan Augmented Reality adalah ianya lebih interaktif kerana pelajar akan menggunakan telefon pintar untuk mengimbas gambar yang boleh memainkan video tutorial. Selain itu, ia sangat mudah digunakan iaitu sekeriannya terjumpa gambar yang tertera perkataan "Scan Me" pelajar boleh terus mengimbas menggunakan telefon pintar mereka bagi membolehkan video tutorial subtopik yang berkaitan ditonton. Selain itu juga, pelajar akan belajar dengan lebih cepat kerana nota interaktif ini membolehkan mereka membaca, menulis nota dan menonton video tutorial pada masa yang sama.

Nota Interaktif C berbeza dengan nota interaktif yang ada di pasaran kerana di dalam nota interaktif ini kaedah Augmented Reality digunakan. Gambar yang terkandung dalam nota ini dapat diimbas menggunakan telefon pintar. Penggunaan kaedah Augmented Reality ini adalah selari dengan revolusi industri 4.0 pada masa kini.

Rajah 2: Sampel Nota Interaktif C menggunakan Augmented Reality.

Rujukan

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SUARA: A MOBILE LEARNING APPLICATION TO ASSIST AUTISTIC CHILDREN IN IMPROVING COMMUNICATION SKILLS

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Introduction
Mobile learning or M-Learning provides effective pedagogical and useful learning activities that can be supported by the wireless technology. This new learning paradigm has captivated the interest of researchers, educators and companies developing learning system and instructional materials. Autistic children need an appropriate learning design that is able to increase learner satisfaction and enthusiasm. Thus, a more fun and memorable learning experience would increase retention of what was learnt. Although mobile learning has made it easier for autistic children to learn, mobile based learning application can be further enhanced by using Artificial Intelligence and Internet of Things to make it more convenient and more appealing to the autistic children to learn. Humanization components that has been added in mobile learning application could help create fun activities for the autistic kids to make it more convenient and more appealing to the students to learn. The mobile based learning application that uses Artificial Intelligence and Internet of Things [IoT] technology could enhance the learning process and could be turned into a wearable device using IoT that makes it more effective as well as more desirable.

This study is intended to investigate the autistic student’s acceptance towards the use of mobile devices as a medium of learning to accommodate the learning experience and complement the effectiveness of traditional learning in order to promote learning. The study is aimed to identify an appropriate and convenient learning environment that could enhance the development and education of autistic children. The solution to the problem is to develop a mobile learning application that uses Artificial Intelligence and Internet of Things that can be used by autistic children. Artificial Intelligence in this mobile application is used to automate basic activities and to communicate. Internet of Things will let the application to be turned into a wearable device like smartwatch. The functionalities of this system are further explained under the scope section. The purpose of developing this system is to help autistic children to learn and communicate easily.

Description
Mobile education can be defined purely in terms of its technologies and its hardware, with learning delivered or supported solely by handheld and mobile technologies. Mobile devices are a pervasive medium as they can help to combine work, studying and leisure in a meaningful (Ahoenen et al, 2003). Sharples has pointed out that mobile devices should be seen especially from the perspective of lifelong learning (Sharples,2000). The existence of mobile device such as any computing device like personal digital assistants (PDAs) and smart phones that can be carried anytime, anywhere with the ability to provide information and enable users carrying out activities while on the move. These definitions, however, are constraining, techno-centric and tied to current technological instantiations (Traxler,2007). Mobile learning or also known as m-learning has now become a popular mode of learning. Students can now access learning contents from anywhere, school, home or even while they are travelling. All they need is just a device like smartphones, laptops or tablets to learn. Although mobile learning has made it easier for students to learn, mobile learning can be further enhanced by using Artificial Intelligence or Internet of Things to make it even easier and fun for the students to learn. Autistic children need a proper learning system that is efficient and fun for them to learn. A
suitable mobile based learning application that uses Artificial Intelligence (AI) technology and Internet of Things (IoT) technology is needed for autistic children. The mobile application that uses Artificial Intelligence could enhance the learning process and could be turned into a wearable device using IoT.

Artificial Intelligence in mobile learning can change learning experience in many ways like smart learning contents and intelligent learning systems. The learning contents can be based on certain levels where the difficulty increases as the level increases. Tutors could be replaced using AI bots so that actual tutors are not needed. On the other hand, Internet of Things allows this application to be used as a wearable device. Therefore, children with autism could use this system for learning and communicating with others.

Autism Spectrum Disorder is a neurological disorder that challenges social, communication and behavior of children (McLaren & Proksch, 2016). Therefore, autistic children usually have difficulties in learning where they require comprehensive interventions to help them to learn (Kinnealey, Pfeiffer, Miller, Rean, Shoener & Elner, 2012). A proper and convenient learning environment could enhance the development and education of autistic children. Special schools for autistic children usually have hands-on based activities for the kids to learn. Some schools have already started using mobile learning applications that were made specially for those kids. Most of those applications were like the activities that are conducted in the school. Students become more independent in school through mobile learning where they become thinkers in a sheltered environment (A. Chitra & Raj, 2018). Artificial intelligence in mobile learning could further enhance the learning process. (El-Kaber & Hachem, 2017) stated that Artificial Intelligence (AI) in mobile learning could detect the learner’s emotions, strengths and weaknesses. Humanization elements that has been added in mobile learning application could help create fun activities for the autistic kids. Thus, this application could also be turned into a wearable system which could allow the application to be used other than in mobile applications, laptops or tablets. Therefore, a suitable mobile application that uses Artificial Intelligence and Internet of Things is needed for mobile learning for autistic children.

The design of the mobile application was enhanced to the following:

- A child-centered approach
- Gamification and play opportunities
- Potential interaction with social partners, providing opportunities for the child to initiate and respond to social communications

This research is concerned with students’ perception pertaining to the mobile learning acceptance as a supplementary mechanism in their learning environment. The objectives of the research are as follows:

- To investigate mobile learning techniques for autistic children.
- To design and develop a mobile learning app for autistic children

The solution to the problem stated above is building a mobile learning application that uses Artificial Intelligence and Internet of Things that can be used by autistic children. Artificial Intelligence in this mobile application is used to automate basic activities and to communicate. Internet of Things will let the application to be turned into a wearable device like smartwatch. The purpose of developing this system is to help autistic children to learn and communicate easily. The scope of research involved the design and development of the prototypes which opportunistically blends human and AI support for autistic children, aged 4-14 years old in their exploration of communication skill. Such amalgamation aims to deliver rich and flexible transactional support to children as advocated in the autism best practices. Here, AI serves as a stepping stone for the communication with the humans, whereby human practitioners provide on-demand support when a child is willing and able to interact and communicate with them, or where a combination of technology and human intelligence is necessary to cater adequately for the interaction needs of the specific child.

The design of the mobile application contains activities that is designed especially for the autistic children. The activities are similar to the ones that is conducted in their school. The design of the product development is a single user technology-enhanced learning environment that utilizes an artificially intelligent (AI) to automate basic activities like grading. Once the user completes an activity, the bot will be giving stars and comments to help them learn and improved communication skills.

The scope of the research involved the design and development of prototypes to evaluate the knowledge recall and transfer of autistics children based on their interaction and communications skills. Thus the scope of the domain knowledge is the memory management concepts. The low fidelity prototypes developed for the purpose of testing the acceptance of the elements with the autistic children and teacher.
Importance to Education

Objectives:
- To encourage and support behavioral change of the autistics children
- To deliver learning activities based on existing evidence of best practice in autism
- To develop an application that is suitable for use in school environment

Value Added
- Develop a game based learning mechanism in order to provide memorable experience for autistic children.
- Develop features that are capable of engaging the autistic children in a multi topic conversation and giving real time feedback on the nonverbal cues, by analyzing the spoken language of the user in real-time.
- Design and Develop the autistic game application which opportunistically blends human and AI in their exploration of communication skills.

Usefulness
This mobile learning mobile application is specially designed for autistic children. The mobile application focuses on these areas:

Learning
Activities that the autistic children have in school will be now be included in the mobile application. This will help those autistic children to learn from a different perspective. They can use this mobile application anywhere they go.

Fun
Several games will be included along with the other learning activities to ensure that the kids learn in an easy and fun way. This could help those kids to learn in an easier way. They will not be stressed when it comes to learning and they will be more interested in learning.

Communication
Autistic children have trouble communicating with other people. This mobile application might help to solve the problem. Those autistic children might find it easier to communicate with their teachers and parents by using the mobile application.

References
MERGING MONOLINGUAL AND BILINGUAL DICTIONARIES USING PYTHON

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Highlights
Dictionaries are important for language classes. When students use different dictionaries, sometimes the meaning of a word can be different or outdated. Showing an online dictionary using a projector can ensure that the students are ‘literally’ on the same page. While online dictionaries are often updated, many do not show word forms or translated meanings. Hence, a software that takes data from three sources was made. It has definitions (Oxford Online Dictionary), word forms (Wiktionary) and translation (Google Translate). Entering a word into the software will display related information about the word from the three sources.

Keywords: Vocabulary Development, Dictionaries, ESL, Translations

Introduction
According to Chen (2011), using dictionary is effective for vocabulary learning in the context of reading. It was found that both bilingual dictionary and electronic bilingual dictionary are more effective than monolingual dictionary and non-dictionary use. To understand an entry in monolingual dictionary, one would need substantial vocabulary and grammatical knowledge. However, monolingual dictionaries provide more in-depth explanations. While slower learners prefer bilingual dictionaries, these dictionaries tend to depend on a one-to-one correspondence of words between first language and target language (Huang and Eslami, 2013). While Chen (2011) did not find significant differences between bilingual and electronic dictionary, electronic dictionaries can literally pronounce words aloud. Medvedev (2016) also suggested various ways of using Google Translate in language classes. Google Translate is fast, free and translation has its root in language learning. However, Google Translate tends to lose its accuracy due to grammatical differences between languages. Since each of the examples has its own benefits and drawbacks, a software that combines them is made.

Description of innovation
The software splits the screen into three parts. On the right side, it shows the webpage in Oxford Online Dictionary. On the upper left, it displays the word forms of the word. As for the translations, it can be found at the bottom left. Simply press the ‘delete’ key to key in a word. Then, press ‘enter’ twice. The software was built using Python.

Context of innovation
It was created during the author’s teaching practice. It is compulsory for the students to bring their dictionaries. The students who use hardcopy dictionaries often complain about their weight. On the other hand, those who use electronic dictionaries might facing problems with battery and Internet connection. Moreover, sometimes the dictionaries give different meanings or are simply too outdated. When students use their own dictionaries, it is hard to check their progress. Using a projector with this software and a wireless keyboard, it is possible for the students to be literally on the same page of the dictionary.

Advantages of innovation
It comes with in-depth explanations from a monolingual dictionary. Being electronic, it can also pronounce a word out loud. The word forms will also be displayed. Google Translate can serve as a bilingual dictionary, thanks to its improving accuracy. Translations can be helpful for beginning language learners.

Commercial value
The software was initially built for the creator’s internship. The creator does not want to commercialize this product because it basically takes data from three sources, none of which is owned by the creator.
References
INNOVATIVE PEDAGOGY BY USING KNOWLEDGE CLIPS TO ENHANCE STUDENT LEARNING EXPERIENCE

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Highlights: In this project, a prototype learning module covering various topics on Fish Biology were designed and created. Knowledge clips were integrated in the module by embedding QR codes. Based on the responses of the students through e questionnaires, it can be concluded that by implementing knowledge clips in the module, it has increased the students’ engagement and interest, cognitive overload, enhanced knowledge acquisition, interdependence, flow and process and feelings of students. These findings were further supported by the students’ results in the course’s assessment and also their personal feedbacks.

Keywords: knowledge clips, YouTube, auditory, visual, technology

Introduction
Rethinking pedagogy for twenty-first century is as crucial as identifying the new competencies that today’s active learners need to develop. Traditional approaches that emphasizing memorization or the application of simple procedures will not develop learners’ critical thinking skills or autonomy. To develop higher-order skills they now need, individuals must engage in meaningful enquiry-based learning that has genuine value and relevance for them personally and their communities.

Advances in digital technology have opened up many avenues for learning, one of it is learning through digital videos. The influence of digital videos on our everyday life is undeniable. Online video sharing sites such as YouTube, Vimeo and others boast monthly audience numbers in millions. With digital videos continuing to gain popularity, it seems natural that this familiar and widespread platform extends into the education setting. Students today are utilizing educational videos as tools for learning everything, and they make up 92% of the digital video viewing audience. Abstract topics that once seemed difficult to teach and learn are now more accessible and understandable thanks to the availability of educational videos.

Description and Advantages of Innovation, Design and Development
For this project, I implemented a video-based learning during my laboratory session, where various knowledge clips of fish biology topics were embedded into a module. The learning module is neither a textbook, a syllabus nor a lesson plan. It comprises of all of these things but does it all differently (Simola, 2007). It curates the world-web links to textual content, pictures, videos and other media that can be embedded into the module. By implementing “knowledge clips” (educational video clips of short duration) in the learning module, it has also created a more engaging sensory experience than just using print materials alone. My students were actually able to see and hear the concept being taught and can process it in the same way they process their everyday interactions. The visual and auditory nature of the knowledge clips also allowed the students to process the information more efficiently. By implementing both visual and auditory cues in the knowledge clips, it enables the students to process the information in a way that is natural to them, as each student prefers different learning style and techniques.
Besides that, by embedding knowledge clips in the module, the module became a go-to resource that can be watched anytime and anywhere with an Internet connection. Through QR codes, these knowledge clips were accessible on a multitude of devices, such as tablets and smartphones. This allows for viewing at student’s convenience and from wherever they are. Information in this module can be viewed before, during and after class, which allows for more practice- and skill-related class activities. These knowledge clips are accessible at student’s convenience and can be watched numerous times to assist them with coursework and skill mastery. With the availability of the knowledge clips, topics in this course that once seemed difficult to learn are now more accessible and understandable.

These knowledge clips which were embedded in the module increase knowledge retention, since they can be stopped and replayed as many times as needed. They can also be reviewed long after the initial lesson was taught. My students were able to learn and grasp new information on fish biology without being overloaded or losing their focus. We added captions and subtitles, as our students are from diverse populations and non-native English speakers.

A prototype of the module was tested on 31 students currently undertaking FMB1110 Fish Biology, Semester 1 2019/2020, Diploma in Fishery program. All of students experience knowledge clips embedded in the module for the first time. A set of 20 items questionnaire was designed to access the students’ first impressions, learning experience and their feedbacks on this module (Bacca et. al., 2014). The questions were designed into six variables: 1. Engagement and Interest, 2. Cognitive Overload, 3. Knowledge Acquisition, 4.Interdependence, 5. Flow and Process and 6.Feelings. The answers are based on 5 point Likert scale.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>1. Engagements and Interest</td>
<td>94.84</td>
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<tr>
<td>2. Cognitive Overload</td>
<td>62.10</td>
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<tr>
<td>3. Knowledge Acquisition</td>
<td>89.25</td>
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<tr>
<td>4. Interdependence</td>
<td>91.94</td>
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<tr>
<td>5. Flow and Process</td>
<td>80.43</td>
</tr>
<tr>
<td>6. Feelings</td>
<td>96.77</td>
</tr>
</tbody>
</table>

Based on the responses of students through questionnaire, it can be concluded that by implementing knowledge clips in the module, it has increased their engagement and interest, cognitive overload, enhanced knowledge acquisition, interdependence, flow and process and feelings of students. These findings were further supported by students’ results in the course’s assessment and also their personal feedbacks.

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References
EXCEL AQUACULTURE IN VIRTUAL CLASS

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Highlights: Aquaculture arose from low to high yields and intensive, self-contained units where the producer has a complete control over the production environment. Over the past few decades, the rapid advancement of aquaculture has this sector known as Blue Revolution. This virtual aquaculture course is designed to provide lesson of basic concept in aquaculture. Furthermore, this course discusses the common practices in aquaculture, important factors in choosing sites and species for aquaculture, water requirement and water quality for fish culture, seed production and larval rearing, fish nutrition, fish health and diseases, post-harvest technology and marketing. The contents are presented in an easy-to-understand manner and accompanied by learning videos, lecture notes, interesting activities and assessment in every lecture unit. Students can also communicate and share ideas with the instructor and other students in each of the topic unit. Most importantly, through this virtual aquaculture class, students will be able to learn the basics of aquaculture interactively at anytime and anywhere depending on their own learning pace.

Keywords: Aquaculture, online learning, cybergogy, virtual class

Introduction
Aquaculture or fish farming has gained momentum worldwide as a viable method to produce fish and fisheries over the last few decades. According to some experts, increasing demand for fresh fish has put a strain on natural populations (FAO, 2018). Aquaculture, the cultivation of fish and shellfish, is gaining popularity in meeting this demand. It plays an important role in the economy, providing thousands of jobs in operations and ancillary services. A study that leads students to become aquaculture entrepreneurs, aquaculture farm managers, hatchery managers, fishery officers, research officers, science officers, lecturers, quality control specialists, scientists and consultants – it’s a field with plenty of opportunity for growth (FAO, 2014). Therefore, aquaculture is declared as dedicated blue revolution event (FAO, 2007) which meaning to the remarkable emergence of aquaculture as an important and highly productive agricultural activity.

In this digital time, the practice of aquaculture has spread around the world. Many species of freshwater and marine organisms are being cultivated as highly productive and nutritious crops for consumption by humans (Munir et al., 2016). The tremendous growth of aquaculture has been stimulated by knowledge that there are intrinsic limitations to the productivity of the wild, unmanaged aquatic ecosystems that humans have traditionally exploited as sources of fish, aquatic invertebrates, and seaweeds. Moreover, in a depressingly large number of cases, the usable productivity of natural aquatic ecosystems has been overexploited or otherwise degraded by humans, and the harvested yields have declined substantially. Therefore, there is an essential to develop the learning materials on aquaculture as a way of exposure on the importance of aquaculture knowledge.

Content
Aquaculture virtual class is an online learning course. This online learning course covers the fundamental of aquaculture with six chapters namely the introduction of aquaculture, site and species selection, brood stock management and seed production, fish nutrition and disease management, post-harvest and marketing and waste management and sustainable aquaculture. This online learning course is targeted at anyone who is interested in exploring the aquaculture knowledge. Lectures presentation is in a form that is easy to understand by users of various ages. Besides lecture notes, there are various interesting contents such as lecture videos, fun activities and also assessment in various forms, all made with the objective for student engagement and understanding on the subject. The virtual class was made using OpenLearning, an online learning platform. Our ambition is to produce a life-long learning of aquaculture that simultaneously provides benefits to the whole community. Like the Chinese Proverb, “give a man a fish, he will eat for a day, teach a man to fish and he will eat for a life time”. Many want to know about aquaculture or fish farming but do not have the opportunity to learn it. Hence, our course provides content for those who want to know about aquaculture and learn it properly. With this aquaculture online learning, students will be able to gain aquaculture knowledge and can then use this knowledge in endless possibilities to change the world especially for the benefit of humankind as well as other living beings.
Acknowledgement
We would like to express our gratitude to the Faculty of Resource Science and Technology for the opportunity to develop this online course. Special thanks goes to CALM, UNIMAS that facilitated in the process of developing the online course.

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A CROSS-DEVICE AND CROSS-PLATFORM VIRTUAL REALITY LEARNING (ViReL) SPACE TO PROMOTE IMMERSIVE LEARNING EXPERIENCES

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Highlights: ViReL space is an economical solution for promoting a virtual reality learning space in Malaysia. With ViReL space, teacher and students are able to use their own digital devices such as mobile phone, tablet, laptop or personal computer to interact in real time with each other in virtual environment. No more need for expensive VR devices, finally affordable VR space that everyone can benefit from.

Key words: Virtual reality, virtual classroom, multi-user interaction,

Introduction
In line with Education 4.0 evolution, virtual reality learning space is the next step in addressing the Net Generation also known as Generation Why. Delivering course material via a virtual environment is beneficial to them because it offers the interactivity and social presence. Plus, previous studies have shown that virtual reality learning space can increases students’ motivation and confidence. As student and educator become interconnected through collaboration and interaction, the virtual environment becomes perpetual learning experience.

Virtual reality technology has existed in various forms for over than two decades. However, high cost proved to be one of the main barriers to its adoption in education, outside of experimental studies. The creation and widespread sale of low-cost virtual reality devices using smart phones has made virtual reality technology available to the common person. Thus, we see increasing trends for virtual reality education.

There are studies that link virtual technologies with improvement in students’ academic performance and motivation [3,4], students’ social and collaborative skills, and students’ psychomotor and cognitive skills. Thus, proving that immersive experiences could promote better students’ engagement by reducing distractions, and creating positive attitudes. VR environment does not only offer an exciting yet challenging way to interact, create, and manipulate objects in a virtual environment, but also adds precision, and permits visualizing objects and processes otherwise impossible to show in a real environment.

Again, lacking of educational VR content causes a slow usage of VR classroom. Moreover, not everyone has the privilege to buy virtual devices such as Oculus Rift, HTC Vive or Samsung gear in getting full immersion experience. These devices are expensive and require a physical space to set-up and calibration is always a hassle. Even the sought-after Microsoft HoloLens for the ultimate mixed reality education cost around RM 20,000 each. Thus, a cheaper and robust solution is needed to ensure that anyone from anywhere can benefit VR education. Hence, we introduce ViReL space, an economical solution of cross-device and cross-platform virtual reality learning space to promote immersive learning experiences.

Content
At present, VR technology improvements various levels of interaction and immersion. One of these possibilities are Virtual Worlds (VWs) like Second Life (http://secondlife.com), which may be used or adapted to train students in any specific discipline, such as construction safety, or medicine and health education or just simply walking through VWs. VWs are user-shapeable to create a flexible virtual learning environment, and it is possible to use services like sharing any user’s computer desktop, showing presentations, attending video conferences, drawing on whiteboards or sharing files. Since a higher degree of immersion and interactivity is desirable, and it will be possible when students can move freely and interact with virtual elements like in a real world, by using affordable body-motion sensors.

To date, living in digital world, everybody owns a digital device, such as mobile phone, tablet, laptop or personal computer. Creating a virtual environment that is accessible from all of these devices adds values to user as they do not need to buy expensive VR devices. This reveals new challenges VR environment because different devices require different field of view on virtual environment, different interaction module and different effect of immersion.
ViReL space provides a solution by developing an interactive cross-device and cross-platform virtual learning space using existing consumer digital devices. Cross-device means a user does not need to have expensive head mounted display (HMD) such as Rift, but he or she could experience our virtual learning space using only smart phone or desktop computer, with or without the HMD. Cross-platform means ViReL solution could be deploy into several different platform such as Android, iOS and Windows.

Figure 1 illustrates the overall design of ViReL space, in which the basic concept is a cloud learning environment, where teachers and students can join in from anywhere using their computer or mobile devices. In smart phone application, we will be using inertia sensor; gyroscope and accelerometer to capture user’s movement inside the virtual world. In windows application, arrows keys used together with mouse movement. Universal interaction translator will interpret user’s speech, gaze and gesture during virtual class. A filtering layer for I/O calibration is programmed before being granted access in virtual learning space based on user roles and input capability.

Figure 1 : ViReL Space architecture

Inside the ViReL space, the teacher can directly speak and show simple gesture to interact with virtual objects or explain complex concepts. Gesture is control by gaze direction and locomotion sensors inside mobile devices. Students are able to respond in their lesson using voice, button selection and chatting (optional).

The first prototype has been developed and tested in science subject, where three problem-based situations are created. The preliminary result reveals that educators and students are keen to use ViReL space in their classes. Students’ engagements are measured during problem solving situation, where we found that the engagement is increased due to representation of avatar. Most students felt that these avatars increase self-confidence and allows them to experience more of hostile situations.

Acknowledgement
We are grateful for GIPP from CADE, UPM.

References
BODYTRAVELAPP: AN INTERACTIVE EAR ANATOMY VIRTUAL REALITY (VR) MOBILE APPLICATION FOR MEDICAL STUDENTS

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Highlights: BodyTravelApp is an interactive mobile learning for human anatomy. BodyTravelApp using virtual reality as a platform to make the learning process more interactive and engaging. From difficult anatomy to easy to learn human anatomy. For the first phase, we are developing BodyTravelApp which we focus on ear anatomy. This BodyTravelApp provides real-journey feedback where all structures will be labelled and accompanied by a brief explanation and justification. The BodyTravelApp is a travel exploring-like App, just like a person entering the body system through the orifices of the body, for example through the ears or mouth or nose.

Keywords: ear anatomy, BodyTravelApp, virtual reality, travel exploring-like, medical students

Introduction
Anatomy is one of the important pre-clinical subjects in the medical program that emphasizes the concept and better understanding of surgery during clinical years. Lecturers throughout Malaysia have highlighted the poor performance of medical students in basic anatomy especially head and neck. This may be due to their inability to retain the knowledge learned in the pre-clinical years. Studies have shown that repeated testing causes significant long-term retention of information. Therefore, a mobile app i.e. Visual Anatomy Lite, Gray’s Anatomy Student Edition will be developed for medical students, particularly Universiti Putra Malaysia students. From that, they will be able to explore the body as they are like a camera entering the body systems. When entering the body, they can have multiple views of normal anatomy and test what students learned. At the same time, create a fun and interactive environment to motivate students to learn more and more.

BodyTravelApp will enhance student’s self-directed learning thus improving the knowledge retention rate which will aid the students during their clinical years. It is expected that BodyTravelApp will be helpful and useful to bring more efficient approaches to teaching Pharmacology and to enhance students’ learning experiences.

Content
BodyTravelApp virtual reality is interactive anatomy of the human body mobile app which adopts test-enhanced learning as a tool to improve knowledge among UPM medical students. During product development, there were 5 phases we encountered:

Design phase (software development)
- Prepare storyboard e.g. interface, navigation, key visual
- Design with low fidelity paper-based prototypes involving outlines of menu, text, icons, etc.
- Design with high fidelity paper-based prototypes.
- Develop the prototype of the mobile application.

Development phase
- Programming on a specified platform
- Import content
- Develop interface
- Develop all components
- Optimize performance of each module
• Test connectivity
• Prepare beta version for user testing

Evaluation phase
• Prototype will be tested with recruited participants (undergraduate Anatomy students) with a high fidelity prototype.
• Empirical studies will be conducted with two groups:
  1) control group – traditional anatomy practical demonstration, i.e. no mobile app
  2) tested group – computer-simulated anatomy practical app developed in the present study, i.e. with a mobile app.
• Both groups will attend the practical session respectively.
• At the end of the semester, a test will be conducted to evaluate their knowledge.

Participant’s test scores will be compared and analysed to determine the effectiveness of the mobile app in aiding learning.
• A questionnaire or interview may be included to obtain feedback on the overall user experience.
• Any problems that occurred or feedback from the task activity will be noted as the new requirements and will be resolved by redesigning another improved prototype.

Analysis phase
• All data of the participant’s scores will be analysed.
• Written transcripts will be prepared from the interview.
• From the transcript, the variables of interest will be defined following a combination of top-down and bottom-up thematic analysis and code development.

Project completion phase
• Design packaging
• The overall research findings will be summarised.
• Research completion and closing reports.

The BodyTravelApp virtual reality enables medical students to explore the body as they are like they are traveling body systems. When entering the body, they can have multiple views of normal anatomy. With this app, students will not only be tested what they have learned but also create a fun and interactive environment to motivate students to want to learn more and more.

BodyTravelApp can be patented and have commercialised value. Every medical school/University will need this BodyTravelApp VR as their pre-clinical module. The outcome of this study can be published in high impact medical education journals.

References
FROM FORMAL LEARNING IN CLASSROOM TO REAL-LIFE EXPERIENCE VIA ELEARNING TOOL

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Highlights: By using existing eLearning tool, the formal learning in classroom for Project Evaluation course will take place outside classroom for real-life experience learning. Applying observation as a method of project evaluation, both offline and eLearning process will be used for students to complete the assessment. Flipgrid application is utilized to support the eLearning process and knowledge development for project evaluation. The integration of eLearning tool in offline task helps to empower student-centred learning in class.

Keywords: formal learning, real-life experience, eLearning tool, Flipgrid application

Introduction

Formal learning occurs in any level of education, with structured learning objectives and learning time. It is intentional both from lecturers and students. The traditional classroom which is most likely teacher-centred learning, where the lecturers are the deliverer of instructions, and students are receiver of information. It is no doubt that the teacher-centred learning works, however it does not mean it achieved 100% effectiveness in education world.

With the advancement of technology, teaching and learning is swift to a broader sight, not only in the classroom. The student-centred learning will help to move from the limitations of the classroom into the world at large. Learning experiences outside the classroom will help to create a collaborative learning atmosphere and provide the real life experiences. One of the ways to extend the learning is by utilizing the technology outside the classroom, in other words eLearning. Study made by Li, F., et Al. (2014), on traditional learning vs. eLearning in higher education shows that eLearning facilitates better high-level learning. eLearning tools assist the learning in many ways. Whether it is in the form of gamification, online instructions or mobile applications, it helps students’ engagement in teaching and learning process. Out there, a huge number of eLearning tools developed for content creation, presentations, graphics and other related.

Content

Project Evaluation and Cost Benefit Analysis is one of the courses offered in Faculty of Social Sciences in UNIMAS. Not only the learning units delivered through formal classroom, the instructors injected the real-life experiences for students to learn on how to do the project evaluation. Thus, both online and offline learning integrated for students to do the observation as an evaluation method for real life situation as shown in Figure 1.

For offline learning, students in a group of two will be given a task to observe the facilities which have potential to be upgraded. They will choose one area for this task and observe also to evaluate the facilities based on the indicators given in the form. Next is by using eLearning tools which is Flipgrid, all groups are required to speak up their observation through video recording within 5 minutes, at the observation area. Flipgrid is a user friendly third party mobile application for eLearning tools in supporting the teaching and learning activities. It has an educator’s dashboard. Educator’s dashboard is where the lecturer creates a grid for students’ group, while the mobile application is to record a video and upload in the grid. In this context, all the uploaded videos can be accessed and viewed directly by all the students in the grid. Through this, students not only learn about their case study, but also from other group as well. Students are allowed to comment directly and give feedback on the videos. Thus, learning process is occurring outside the classroom through Flipgrid.

Figure 1: Process of Integration Offline and Online eLearning Tools for Real-Life Experience Learning
The integration of both offline and online for learning outside the classroom is essential for student engagement in teaching and learning process. By bringing the formal learning in classroom to real-life experience, with the support via eLearning tool, the mode of student-centred learning is enabled and empowered student in developing their knowledge on the subject matters. Both offline and eLearning is important in this course because offline learning will give the human touch to the cognitive development, while the eLearning will facilitate the learning process. This process looks simple, which is apply the existing eLearning tools in teaching activities, but it gives a huge impact to student in their learning process. Thus, this concept can be applied not only for higher education level, but also to primary and secondary education levels too.

**References**


THE EFFECTS OF DESIGN-BASED LEARNING IN TEACHING AUGMENTED REALITY FOR PRE-UNIVERSITY STUDENTS

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Highlights: This research project is about the innovation of a teaching and learning approach with the integration of augmented reality as the tool and the subject, named design-based learning (DBL), aimed to empower pre-university students’ learning performance and motivation. Across three lecture groups (n1 = 114, n2 = 98, n3 = 95), there is an increased in mean marks between two tests conducted prior to and post of DBL. The mean scores for learning motivation captured using instructional materials motivation survey (IMMS) for attention, relevance, confidence and satisfaction model are all above average of 3 out of 5.

Keywords: augmented reality, computer education, classroom technology practices, learning strategies, design-based learning, immersive participation

Introduction
The aim of this research is to investigate the effects of design-based learning approach in terms of performance and motivation for pre-university students to learn augmented reality in the ICT Competency course. However, most students in the pre-university level came from pure science stream during school with minimal ICT or computer science knowledge.

Content
Design-based learning is a variation of problem-based learning that enables the learners to apply the technology to solve a task to design and develop a science-themed learning material embedded with augmented reality. The design-based learning is implemented with 3 phases, namely planning, implementation and evaluation. The results show that there is an improvement in students’ performance. Moreover, it is found that this learning approach shows a high motivation among students in the attention, relevance, confidence and satisfaction factors.

Based on the results, design-based learning empowers the students on self-directed learning by focusing on the goals of design and development, to master the content and directly apply the knowledge to enhance their higher order thinking skills. The feel of satisfaction to complete the product perfectly motivates the learners. Students also understand the relevance of the topic and project. This enable students to be attentive towards them. However, students’ confidence factor is low due to the new technology. This seems to be like an uncharted area for the students. The practical implications and suggestions for future research is later presented.

Table 1: Mean scores for students’ motivation based on ARCS model.

<table>
<thead>
<tr>
<th>Lecture Group</th>
<th>n</th>
<th>Attention</th>
<th>Relevance</th>
<th>Confidence</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>114</td>
<td>3.44</td>
<td>3.71</td>
<td>3.24</td>
<td>3.75</td>
</tr>
<tr>
<td>F2</td>
<td>98</td>
<td>3.30</td>
<td>3.64</td>
<td>3.18</td>
<td>3.67</td>
</tr>
<tr>
<td>F3</td>
<td>95</td>
<td>3.45</td>
<td>3.71</td>
<td>3.30</td>
<td>3.77</td>
</tr>
</tbody>
</table>

Acknowledgement
This research is supported by Universiti Malaysia Sarawak (UNIMAS) under the Scolarship of Teaching & Learning (SoTL) grant scheme number SoTL/PPPU/2018(1)/002.
BLUE TOOTH SMART BASED ATTENDANCE SYSTEM FOR TEACHING AND LEARNING

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Highlights: Bluetooth technology is a wireless technology aimed at innovative applications in solving short range application such as the healthcare, fitness, beacons, security, and home entertainment industries. The technology makes use of electronic tags to facilitate automatic wireless identification, with a Bluetooth Smart enabled device. We are attempting to solve the problem of students’ attendance monitoring using a Bluetooth smart based system. The objective of this application of Bluetooth smart based system is to improve student attendance time taken during manual attendance, minimize human errors and provide administrators the statistics of attendance scores for use in further managerial decisions.

Keywords: Bluetooth technology, smart attendance system, Monitoring system, wireless application

Introduction
The proposed Bluetooth Smart Based system uses mobile device with Bluetooth technology to detect MAC address stored in student’s mobile device. Every student required to register MAC address before he/she enrolled in the class. When he/she attends the lecture, a MAC address in the mobile device is associated with the student database entry. Therefore, every time a student carries his/her mobile device and is attending the lecture the entry will be registered into the database with the time stamp as the lecturer moves around the class and the application detects the mobile device. Also, the application is configured to detect mobile device only within a specific range in order to avoid detection of mobile device that are outside of the classroom. The lecturer or administrator can use queries provided by the application to obtain more information about the attendance of a specific student or the entire class. Additionally, the lecturer can grade students based upon their attendance for a specific course and can also generate reports weekly, monthly or for an entire semester. It will be beneficial for the students as well as the lecturers of the respective universities and colleges as with the advancement of this system they can utilize their lectures in the best manner. Therefore, we can conclude that in the future, we can consider Bluetooth Smart Based Attendance System as a good option to meet the needs of effective teaching and learning tool in the era of Education 4.0.

Acknowledgement
The authors would like to express their gratitude to Universiti Sains Islam Malaysia (USIM) for the support and facilities provided.

References
MOBAS: MOBILE BARCODE SCANNER BASED ATTENDANCE SYSTEM FOR EDUCATION 4.0

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Highlights: Attendance plays significant role for higher education institution in Malaysia to determine whether the students are eligible to attend the final exam. A preliminary study has been conducted where manual attendance system is used for recording the student attendance via manual list. The attendance data is recorded and transferred into spreadsheet software manually by the lecturer. Universiti Sains Islam Malaysia is not excluded as one of the universities that uses the manual attendance system where it consumes a lot of time. The total number of students keep increasing every year and information is no longer limited. Hence, information management becomes one of the most challenging issue faced by any organisations including higher education institution. A mobile application barcode scanner (MOBAS) using code 128 which generated by dashboard is proposed and developed to increase the efficiency and improves the confidentiality of the records systematically. MOBAS is an alternative way of conventional method where paperless and online management for Education 4.0. It is a respond to the needs of Industrial Revolution 4.0 where human and technology are aligned to enable new opportunities.

Key words: Mobile application, Attendance system, Barcode scanner, Education 4.0

Introduction

Attendance system in educational institution is a system where ones can monitor student availability and progress in each scheduled class. Most of the attendance system used in educational institutions are conventional system that are still using paper based. An attendance sheet is given to the students for them to fill in or tick their names as a proof. The attendance data then updated manually into the system by the the lecturer of the subject. The calculation regarding the student attendance percentage is also calculated manually which will lead to human errors such as miscalculation.

In Universiti Sains Islam Malaysia (USIM), attendance percentage is crucial for the students. The attendance percentage is used to monitor the student performance and to verify whether the student can enter the final exam hall. 80% of attendance percentage is the least requirement for a student to acquire in order to allow them to sit for the final exam. If the attendance percentage is below than the requirement, the student will be barred from attending the final exam that cost them to repeat the subject in the following semester.

The smart mobile attendance system using Code 128 barcode has been developed to increase efficiency and to improve the confidentiality of the information based on the data taken during the class. Using the manual attendance system have an issue with its data authentication as some irresponsible student may fill in or tick for their friend’s attendance. Due to the mentioned reason, some data may not be authenticated. MOBAS will help lecturers to eliminate the time and effort wasted in taking attendances, inserting the data into the system and calculating the student attendance percentage. Thus, MOBAS provides a lot of improvement compared to the conventional method where it also fulfils the need of Education 4.0.

Acknowledgement

We are grateful for the facilities and support given by the USIM specifically BIPP.

References

DASHBOARD MONITORING SYSTEM FOR POSTGRADUATE STUDY

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Highlights: A successful university relies on a good supporting system. In order to manage the postgraduate matters efficiently, a dashboard monitoring system (DMS) which is a part of an integrated portal postgraduate system (iPPS) have been proposed and implemented. This developed product consists of six winning features of e-Learning which are (i) anytime, anywhere, (ii) cost effective, (iii) global reach, (iv) just-in-time learning, (v) personalization and (vi) collaboration and interactivity. iPPS promotes asynchronous learning where it offers feature such as dashboard monitoring system. The strengths of this product are paperless, online tracking by all users and integrated supporting management system for postgraduate in USIM. User requirements have been identified thoroughly by conducting several interviews with the stakeholders and meetings for confirmation on the user interface design. Functionalities for this module also have been tested before the deployment phase. In terms of commercial value, DMS which is a part of iPPS can be marketable to local and international institution due to its flexibility on the features setting.

Keywords: monitoring system, dashboard, postgraduate students, web based application

Introduction

Currently, in Universiti Sains Islam Malaysia, there is more than 1000 postgraduate students that need to be managed. The university needs an efficient, easy and accurate systems to fulfill clients and stakeholders needs. Previously, a user needs to make a query to database and analyze them thoroughly before any decision is made. It is also possible that the data given was not aligned with the user’s request. Data analysis is also a time-consuming process. As the data received through manual query it may cover for a certain duration, the analysis might not include real time data and may not represent the whole situation. Through the dashboard monitoring system, users may use real time data displayed on the dashboard to learn, investigate, deduce and decide on crucial issues. This feature allows any user to learn on the current real situation of postgraduate in USIM as it covers the whole postgraduate study process. Early implementation shows that this monitoring system is capable in meeting the user requirements and fulfilling the features of e-Learning system.

Content

Product Design.
Dashboard Monitoring System (DMS) main users are PPS, faculty and university management. This monitoring system consists of six main modules that are (i) enrolment, (ii) admission, (iii) registration, (iv) myra, (v) withdrawal and (vi) thesis. Each module carried out submodules according to the needs.

Novelty and Inventiveness
Dashboard Monitoring System (DMS) is a dashboard monitoring system to support the management system and the data retrieved from this system is connected to another seven disjointed systems in USIM.
Dashboard Monitoring System (DMS) is applying the concept of eLearning which promotes easy access and anytime and anywhere for specific users in USIM especially for the higher management.
Dashboard Monitoring System (DMS) covers the whole important scenario of USIM postgraduate in a glance.
Dashboard Monitoring System (DMS) may also filter certain data and generate statistics without even referring to the database hence, any user without technical knowledge may be able to obtain the important data.
Dashboard Monitoring System (DMS) presents the requirement of MYRA data.

Practicality and Usefulness
Dashboard Monitoring System (DMS) covers all the six winning features of e-Learning which are (i) anytime, anywhere, (ii) cost effective, (iii) global reach, (iv) just-in-time learning, (v) personalization and (vi) collaboration and interactivity. iPPS was launched in February 2017 and the Dashboard Monitoring System (DMS) was added as an additional feature in early 2019 to cater the need for monitoring on the postgraduate students.

Target audience
Dashboard Monitoring System (DMS) is targeted to be used by higher management for decision making and the postgraduate management center in any universities.

**Commercial value**

Dashboard Monitoring System (DMS) has a high commercial value among the higher education. The feature provided in DMS will speed up the process of learning on the current situation of the postgraduates in USIM. This system can be marketable to local and international institution.
GAMIFYING A MOOC: MOTIVATING LEARNERS

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Highlights:
This study recommends a set of guidelines for choosing and incorporating motivating gamification elements into MOOCs. These guidelines are significant to MOOC designers and developers, particularly for those who intend to develop motivating gamified MOOCs.

Keywords: MOOC; Gamification elements; Guidelines, Motivation; FAHP method

Introduction
Shah (2018) reported 101 million learners and more than 11,400 MOOCs offered by over 900 universities in 2018. Despite the tremendous proliferation of MOOCs, ample doubts and critics toward MOOCs are also raised. The most profound downside of MOOCs is the high learner drop-out rate, which is consistently as high as 90 percent (Jordan, 2014; Ma, & Lee, 2019). Indeed, the constantly high drop-out rate in MOOCs remains as a challenge to many MOOC providers. Many studies suggest that the incorporation of gamification elements into MOOC is a potential solution to address MOOC high drop-out rate (Dicheva, Dichev, Agre, & Angelova, 2015; Skiba, 2013; Willems et al., 2014). Gamification refers to a process of improving practices with the aid of motivational affordances as to raise gameful user experience in non-gaming context (Hamari, 2013).

As motivation is crucial to sustain learners’ engagement in MOOCs, a study that employed a multiple-criteria decision-making (MCDM) method known as Fuzzy Analytical Hierarchy Process (FAHP) was conducted to determine the relative motivational contributors of various MOOC gamification elements based on ARCS (Attention, Relevance, Confidence and Satisfaction) motivational model.

The study reveals that Acknowledgement, Avatar and Time Limit as the top three attention-gaining gamification elements; Levelling, Badge and Acknowledgement as the top three relevance-driven gamification elements; Point, Badge and Cooperation as the top three confidence-building gamification elements; and Leaderboard, Opponent and Badge as the top three satisfaction-yielding gamification elements.

This study also recommends guidelines for choosing and incorporating motivating gamification elements into MOOCs. These guidelines are significant to MOOC designers and developers, particularly for those who intend to develop motivating gamified MOOCs.

Acknowledgement
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References
ICT COMPETENCY MOOC: PIONEERING LARGE SCALE MOOC IN MALAYSIA

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Keywords: ICT Competency, MOOC, blended MOOCs, UNIMAS MOOC

Introduction
Universiti Malaysia Sarawak’s ICT Competency MOOC began 5 years ago in 2014 as one of the four pioneer MOOCs developed by public universities in the country for the Malaysia MOOCs project. The other three MOOCs are Islamic and Asian Civilizations (TITAS), Introduction to Entrepreneurship, and Ethnic Relations. The Malaysia MOOCs project is in line with Shift 9: Globalized Online Learning stated in the National Education Blueprint 2015-2015 (Higher Education). This MOOC was first named IT Literacy, but was later renamed to ICT Competency, to equip students with competency instead of just literacy in ICT. Also, incoming student intakes are found to have sufficient IT literacy before entering university, having learned the syllabus in school, and having more exposure to ICT. The first version of this MOOC has only 5 learning units (LUs), namely The Computer System, The Internet and WWW, Security and Ethics, Computational Thinking, and Open Source Technology. Today, after several revisions, the updated version of ICT Competency MOOC has 9 learning units: Overview of Computers and ICT, The Computer System, Communication and Networks, The Internet and WWW, Information Systems, Computational Thinking, Open Source Technology, Computer Security, Privacy and Ethics, and ICT Knowledge in Various Domains. Each learning unit contains three types of contents: lecture materials, quizzes, and ViFlections. Lecture materials consist of notes, videos, articles and other relevant materials that were both created and curated. ViFlection—a term coined by the UNIMAS MOOC team—is short for Video Reflection. ViFlections are scenario-based videos showing the life of local university students in dealing with ICT. To complete a unit, students need to watch the video and answer questions to help the characters solve their problems - this helps the students to reflect on what they have learned in the unit. During its first year, ICT Competency MOOC has 5,588 students from 70 countries.

Context of Innovation
At present, there are 26,348 students from more than 80 countries enrolled. These countries are from all continents in the world except for Arctic and Antarctica. This current number of students includes UNIMAS undergraduate students who are enrolled in a “private” ICT Competency MOOC. This “private” MOOC has contents similar but enrollment is restricted only to UNIMAS students for the ease of tracking and monitoring them, considering the five figure number of students. UNIMAS has begun using this MOOC as the main medium of delivery for its generic course MPU3412/TMX1022 ICT Competency in September 2018 for the 2018/2019 academic year. MPU3412/TMX1022 is a mandatory 2-credit course that every UNIMAS student must complete as a graduation requirement; majority of the undergraduate programs offer MPU3412 in the first year of study. MPU3412/TMX1022 has its roots in two now-defunct courses: TMX1010 End User Computing and TMX2012 IT Tools for Knowledge Workers, which were embedded in the programs to provide students with basic ICT knowledge. Both courses were shelved and TMX1022 ICT Competency was created in 2015 after a major curriculum review. In 2017, TMX1022 is changed to MPU3412 on a directive from the Ministry of Higher Education on rebranding the names of university generic courses. Since the ICT Competency MOOC’s inception, it was used as supplementary materials for the MPU3412/TMX1022 course, as part of the blended learning environment. Then, in September 2018, the university began delivering the MPU3412/TMX1022 course 100% through MOOC. All teaching and learning activities, and assessments (except final exam) were conducted on the MOOC platform. This MOOC is also used by Universiti Perguruan Sultan Idris (UPS) as materials for their ICT course.

Acknowledgements
We are grateful to the Ministry of Education and Universiti Malaysia Sarawak for the opportunity and support in carrying out the ICT Competency MOOC project.

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AUTIPECS 2.0: MOBILE BASED LEARNING USING PICTURE EXCHANGE COMMUNICATION (PECS) FOR CAREGIVERS WITH AUTISTIC CHILDREN

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Highlights:
The aim of this research is to come out with an innovative solution by developing a mobile based learning application on PECS program for ASD children’s caregivers. The development of AutiPECS is an act of support for the inclusiveness of education for autistic children by providing an effective mobile learning platform for the caregivers. AutiPECS is aimed to help reduce the cost of sending ASD children to speech therapists and caregivers can use to learn more about communication intervention and to practice it themselves. PECS is an alternative intervention to teach ASD children to communicate in social contexts currently practiced in many autism children centers.

Keywords: Autism, PECS Intervention, Mobile based learning

Abstract
Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder causing abnormality in one’s social, communication and behavior. It is diagnosed based on early-emerging social and communication impairments and the tendency to behave differently than would a normal child. The global statistics report an increase in the total statistics from year to year. Early intervention will increase the possibility of an autistic child having a better future. The communication intervention program for autism recognized as Picture Exchange Communication System (PECS) is believed to be an emerging practice for autism. Studies show that caregivers with autistic children are generally lack of disability awareness and have moderate knowledge in special needs education. The ratio of experts to Autism Spectrum Disorder (ASD) children is way below par. The main question highlighted in this research is “What are the alternative support that could be given to caregivers with autistic children”. The aim of this research is to come out with an innovative solution by developing a mobile based learning application on PECS program for ASD children’s caregivers. The development of AutiPECS is an act of support for the inclusiveness of education for autistic children by providing an effective mobile learning platform for the caregivers. AutiPECS is aimed to help reduce the cost of sending ASD children to speech therapists and caregivers can use to learn more about communication intervention and to practice it themselves. PECS is an alternative intervention to teach ASD children to communicate in social contexts currently practiced in many autism children centers. The content structure of AutiPECS comprises the introduction, initial preparation, strategies and activities.

ADDIE in Instructional System Design (ISD) model is applied as the methodologies with the help of Framework for the Rational Analysis of Mobile Education (FRAME) model to construct ideal content and achieved the development goals for the entire process. The application is developed by using Android Studio open source software solution. By using mixed method evaluation, usability testing was aided with key logging, questionnaires and instructed interviews.

AutiPECS have been developed properly with the application of ADDIE principle and FRAME model. The contents have been assessed by experts and the motivation of the caregivers using the mobile application have been analyzed. The usefulness of the application is amply demonstrated via its many positive effect on target users. Future works may also be integrated with interesting interface design, multilingual platforms and combination of other approach in mobile application as a centralized mobile learning.

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ELVA: AN E-LEARNING VIRTUAL ASSISTANT IN BOT MESSENGER FOR LMS IN ENHANCING STUDENT LEARNING EXPERIENCE

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Abstract:
ELVA is a bot messenger that designed as a virtual assistant to enhance student learning experience. Since this bot or chatbot is an application that living in messaging apps that able to converse through text, audio or button, ELVA is integrated in Facebook messenger platform as part of interaction channel of Learning Management System (LMS) for student in Universiti Malaysia Sarawak (UNIMAS). ELVA also manage to assist the student in their academic journey at UNIMAS such as providing personalised class schedule, examination timetable, attendance status, and personal reminder. In addition, ELVA can also be integrated with eLEAP or ePelajar via Messenger app to enable ELVA to response intelligently based on student’s preference by reference to the student’s existing profiles. By using ELVA in FB Messenger App as part of LMS at UNIMAS, the student’s learning experience will be immersive and engaging without installing any apps or browsing UNIMAS eLEAP, or eStudent or requiring a teacher to answer repetitive questions as in the traditional learning environment.

Keywords: e-learning, LMS, chatbot, virtual assistant, enhancing learning

Introduction
Currently, the increasing usage of Information and Communication Technology (ICT) in education, has led to various researchers using and developing technology tools in order to contribute to the education sector. It has also introduced many innovative solution and methods in education sector. Along with the development of the times, Artificial Intelligence (AI), began to take and change the world of education quickly as responding to government agenda in Education 4.0. Education 4.0 integrates the innovative technologies of AI in the blended learning (Ciolacu M et al., 2017). One of the latest innovations is chatbot which is currently very useful and most innovative tool for learning.

In recent years, there has been an increased use of chatbots. Chatbot is the latest way that some of higher education institutions enable users communicate with messaging systems, like Apple Siri and Alexa Amazon. More simply, chatbots are computer programs living in messenger applications and emulating a conversation with a human either through text messaging or with a simulated voice to provide certain service (McLean et al., 2016). To be able to use, chatbots can work based on artificial intelligence.

Generally, chatbots are programmed to operate according to predefined instructions. If chatbots interact and learn more new stuff then chatbots will get much smarter. Previously, chatbots are commonly used in e-commerce in figuring out how to automate task of answering repetitive questions posed by customers such as in customer service. Therefore, extending the concept to e-Learning could mean using a chatbot for student engagement. As in learning environment, engaging with the students play an important role to keep student motivated and focused in their learning so as to enhance learning outcomes of all students (Schlechty, 2001; Woolfolk & Margetts, 2007). Some researchers think implementing chatbot might increase engagement and enhance learning, as some students who are ashamed to ask a lecturer a question in front of their peers might prefer to talk to a software robot (Jafari, A., 2002). On the other hand, students have a lot of repetitive questions and they have similar type of questions regarding their subject. Entertaining this can be time consuming for lecturer. Chatbot can help a lecturer to answer the similar type of questions while releasing up more time for detail discussions and interactions between teacher and student. Not only that, the students are able to get prompt response and based on student needs.

Considering all these reasons, this project aims to improve student-learning experience through chatbot named ELVA by utilizing student profile in student databases such as in UNIMAS eLEAP (Moodle) or eStudent. The ELVA is developed by utilizing Dialogflow chatbot development platform and linked to Firebase console that store student database through webhook application. The connection to database is using fulfillment function in Dialogflow that enable user to parse JSON code from JSON structure database back into Dialoglow as illustrate in Figure 1. Due to confidential and policy of term and agreement issues, all the student’s information will not be extracted from official UNIMAS student database system. A dummy database system has been created to replace the official system to address this issue in a way to demonstrate prove-of-concept. The ELVA are purposely designed to provide respond...
on class and examination schedule, the schedule of the assessment for the subjects taking by the students in the current semester, attendance status, exam result and add reminder, that instantly and personalize response based on student’s preference using their profiles.

Since Facebook Messenger is one of the most widely used application installed on students’ smartphone that can be accessed anywhere and everywhere through Internet connection, therefore by leveraging eLVA chatbot used in messaging apps do not require the students to install the additional application that essential additional space in their phone. Moreover, eLVA can provide response instantly to the students based on student needs where such information can be obtained through conversation rather than navigating the UNIMAS eLEAP or eStudent by themselves or go to faculty office for meeting their lecturer just asking a simple inquiry that requiring time and effort. Equipped with AI techniques, machine learning algorithms and natural language processing features capability, eLVA can understand the student needs by analyzing the questions uttered through text conversation. In other words, eLVA has an ability to learn from the student’s utterance to personalize the interaction and build off previous interaction.

Moreover, due to its novelty, there is lack of research on the effect on engaging, motivation and performance observed in learners that interact with bot-based technologies. We envisage that eLVA has the potential to be expanded into full scale version where later students only need messaging application to plan their academic journey. The eLVA is a potential agent to expand into a full scale for student used by simply sending messages or inquiries through messenger platform in planning their academic journey. This helps students stay connected or engaging to academic matters without boundaries.

Acknowledgement
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References
TWO-STAGE HEURISTIC FOR PRIMARY SCHOOL TIMETABBING PROBLEM WITH COMBINED-CLASS CONSIDERATION

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Highlights: This research focuses on a primary school timetabling problem, a small-scale primary school that is located at Pengerang, Johor. Ministry of Education (MoE) Malaysia introduced new policies for solving teacher shortage and overloaded school bag issue. There is a set of hard constraints in this primary school timetabling problem due to the stipulation that a teacher can only teach one subject at a time; each subject must satisfy the total weekly period(s) and the combined classes can only combine one subject at a time. A two-stage timetabling heuristic approach been proposed. The result generated by this proposed solution outperforms the current manual practice in solution quality and computing efficiency.

Keywords: Combined Classes; Government Policy; Primary School Timetabling; Small Scale Primary School; Two-stage Heuristic.

Introduction
School timetabling is the arranging of subjects for a week for all classes in a school [4]. School timetabling is a vital activity for each school and it is a time consuming task. The quality of the school timetables has a huge impact on its educational system [1], [2]. School timetabling problem is a complex combinational optimization problem. According to [3], a school timetabling problem is a NP-hard problem.

Case Study
The primary timetabling problem in this research is an actual case study of a small-scale primary school that is located at Pengerang, Johor. Table 1 shows the number of students, teachers and classes in this primary school from year 2017 until 2019.

Table 1: Number of teachers, students and classes in small-scale primary school

<table>
<thead>
<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of teachers</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Number of Students</td>
<td>23</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Number of Classes</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

The total amount of students in this primary school for the last few years has been less than 30 people. Due to the shortage of teachers The Ministry of Education (MoE) has announced a new policy on 12th Dec 2017 for combine classes in low-enrolment schools with fewer than 30 students.

Other than that, on 30th June 2018 The Ministry of Education (MoE) has also introduced a new policy to solve the overloaded school bag issue. MoE suggests that teachers make a clear statement or announcement as to what the students should bring to his or her class and has recemmended for schools to teach only three to four subjects each day.

Methodology
A two-stage heuristic method is applied in this study. In stage I, teacher clustering is conducted with consideration of combined-class. Timeslots allocation stage is the second stage that allocates timeslot for each smaller cluster generated at first stage.

A set of subject group is defined as $G = \{G_1, G_2, \ldots, G_g\}$ and $g$ is the total number of subject groups. The teacher clustering stage assigns $n$ subjects into $g$ subject groups, where $n > g$. The teacher clustering stage assigns the subjects with no common teachers into a subject group. Number of subject group, $g$ is not prefixed by the two-stage heuristics.
algorithm that is proposed in this study. The number of subject groups is calculated according to the total weekly periods of teachers.

Timeslots allocation stage allocates the assigned subject group generated in Stage I into available timeslots. A pairing matrix is a matrix to identify the pairing ability of subject groups to be allocated into timeslots. For $g$ number of subject groups $G$, a $g \times g$ matrix will be generated. The timeslot allocation will allocate subject groups with the highest pairing ability in same day to meet and maximise the soft constraints. Subject group with preference subject will be allocated in timeslots before recess.

### Result and Analysis

The timetable that has been generated by this two-stage heuristic algorithm outperforms the current manual practice. The total computational time to generate a timetable by this two-stage heuristic school timetabling system is bounded to ten seconds as compared to the current manual practice solution, which may take days to develop a timetable. Figure 1: Graph of result analysis.

![Graph of result analysis](image)

The average teaching slot for each teacher in a day is between four to six teaching slots per day. All plotted graphs show that some teachers are having eight or nine teaching slots in a day for manual solution. The simulation model of the two-stage heuristic algorithm manages to reduce the high teaching slots. The statistics show that there are 68% teaching slots in the year 2017, which was in the acceptable range, and 70% for both 2018 and 2019.

In order for solving the overloaded school bag issue, the two-stage heuristic algorithm has considered the new policy of decreasing the number of subjects being taught in a day. The simulation model of the two-stage heuristic algorithm has improved the timetable by decreasing the number of subjects that are taught in a day with a minimum of four subjects, and eliminates the highest number of subjects that is taught in a day i.e. eight subjects generated by manual solution.

### Conclusion

The result generated by this two-stage heuristic approach had outperformed the current manual practice in solution quality and computing efficiency. This two-stage heuristic school timetabling system provides an easy and faster way to generate a primary school timetable.

### References


HYBRID LEARNING INITIATIVES: SYNERGY AND EFFECTIVENESS. A CASE OF PERFORMANCE MANAGEMENT COURSE

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Highlights:
Hybrid learning initiatives was applied to Performance Management course with 100 students. This project tried to examine the use of collaborative and cooperative learning and how service learning concept can be integrates nicely to meet adult’s learner’s expectations. A traditional lecturer role was change with more robustness approaches. Course content, people expectations, technology, creativity and innovation were the focus of these initiatives. Problem solving approach was integrated in these learning initiatives. Overall results shows that 100 % students past with a good grades, their level of satisfaction are extremely high and they really enjoys and have a meaningful learning experiences.

Keywords: hybrid approach, community engagement, service learning,

Introduction
The success of adult learning teaching sessions depends on many factors. The learning innovation implemented is a hybrid approach to teaching and learning for adult’s learners. In addition to the traditional approach of weekly lecture meetings, other techniques such as community engagement project, action research initiatives, case studies, organizational analysis, systematic reasoning, focus group assignments, individual field notes, on-line data mining, community dinner, local leaders, industry player and all related government agencies public and privates and also non-governmental organization also involves in this project. Industrial Revolution 4.0 which related closely with information, communication and technology development were taken into account for sustainable collaboration between higher educational providers will all the related stake holders. The role of lecturer is no longer a teaching but also as facilitator, adviser, consultant, helper, trainers and mentors.

Description
1. This innovation relates to the use of hybrid approaches in the teaching process of adult learning in higher education institutions.
2. Focus on project-based learning in the community.
3. The reliable model of teaching approaches with involves all relevance parties has been identified.
4. Learning is fun, meaningful and practical.
5. All the learning activities start with mutual discussion and decision from related parties.

Context of the innovation
1. Previous students complain that the course content is too academic and more on theoretical view than practical perspectives.
2. Students find it difficult to apply the course content in the context of a work environment that is practical and easy to understand.
3. The normal bell curve on the exam results is not a strong indicator of good performance among the student.
4. The previous learning process was more on lecturer centric and student engagement was very limited.
5. Percentage of absenteeism is high for lecturing hours.

Importance to education
1. Students love to engage in learning activities.
2. Students’ level of understanding is increasing.
3. Students begin to question and instill curiosity and try something new.
4. The role of students in teaching activities is more constructive and less passive.
5. The hybrid learning approach takes into account the potential spread of students in a balanced and holistic way.
6. Community projects are practical and more on human touch.
7. Many parties are involved in project implementation and promoting smart work partnership.
8. Develop high level thinking skills rather than low level of thinking skills.

Advantages
1. Learning is more relaxing but meaningful.
2. This learning model is flexible and dynamic.
3. The learning module can be adapted to the current situation and available resources.
4. Communities feel valued and their experiences recognized.
5. Examination components that cause stress are converted to constructive and interactive learning approaches.
6. The community wants to be actively involved.
7. Communities openly accept the presence of students in their area.
8. There is smart cooperation between all parties involved.

**Commercial value**
1. Pioneering the concept of one home and one product.
2. This hybrid learning model is in the process of being purified before being patented.
3. Propose the concept model of 21st century village for semi-urban surrounding concept.
4. The village coffee table book and its development are underway.
5. Propose concept model for sustainability service learning project.

**Acknowledgement**
We are grateful for the Jawatan Kuasa Kemajuan kampung Sinar Budi Baru Batu Kawa, Majlis Perbandaran Padawan and YB Sim Kui Hian, Members of State Assembly (N14) and FSKP, UNIMAS for supporting this initiatives

**References**
MY IDEATION SPACE (MY IDEAS) – A MOBILE APPS FOR PROBLEM SOLVING ACTIVITY

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Highlights: My iDeaS, a mobile apps that is designed to support problem solving activity, deploys three core modules - Smart Screen Control, Smart Manager and My iDeaS Editor. The apps can permit users to capture real-life problems to stimulate their learning related to doing problem solving. It is equipped with a feedback system, i.e., Smart Manager, to systematically guide users and to provide ability to tap into external experts from industry, and bring their expertise into classroom. Learners use My iDeaS Editor equipped with three interactive modules: Multispace Thinking Method, Questioning Toolkit and Visual Ideation tools. My iDeaS promotes “Anytime-Anywhere Learning”.

Keywords: ideation, design thinking, problem solving, PBL, mobile apps, T&L practices

Introduction
My iDeaS, a mobile apps, is designed as a teaching aids to facilitate users in doing systematic problem solving. The apps deploys three core modules: Smart Screen Control, Smart Manager and My iDeaS Editor. It provides a personalized learning tool to assist learners in thinking about solving problems creatively and critically, constructing their own knowledge base and obtaining feedback from experts to ensure they can arrive at a particular solution, solving the right problem. My iDeaS facilitates a course instructor in their T&L practices to plan and manage problem solving activity in classroom setting that strongly emphasizes on flexibility and promotes “Anytime-Anywhere Learning”.

Description of Innovation
My iDeaS is equipped with Smart Screen Control module to be utilized by a course instructor to manage learners’ problem solving activities and to provide systematic guidance by connecting them with experts from relevant business sectors. My iDeaS integrates these external experts and bring their expertise into classroom setting by using Smart Manager module. The apps permit learners to interact with experts and to gain benefits via this feedback system. The learners use My iDeaS Editor that is equipped with three interactive features as follows: Multispace Thinking Method, Questioning Toolkit and Visual Ideation tools. Using My iDeaS Editor, the learners will be able to capture real-life problems that interest them, and be involved creatively and critically in the thinking process to solve the problem. Figure 1 shows a visual snapshot of My iDeaS apps and its related technological design components. Figure 1: Visual Snapshot of My iDeaS apps
The Importance of My iDeaS

Confronting complex problems effectively and constructively, emerging from VUCA – Volatile, Uncertain, Complex and Ambiguous – environment, necessitates good skills in the domain areas of problem solving, decision making, critical thinking and creative thinking. Reflecting on the global challenges facing by higher education sector, Thomas (2009) argued that the pedagogy of Problem based Learning (PBL) should establish strong connection with the domain of critical thinking and sustainability framework in order to effectively instigate pedagogical change at a larger scale across all disciplines. PBL provides a stimulating learning environment to develop learners’ problem solving and other important skills including critical thinking. Ennis (1985: 45) broadly defined critical thinking as “reflective and reasonable thinking that is focused on deciding what to believe and do”. In this perspective, problem solving and decision making are part of important critical thinking process. Critical thinking, as a higher order thinking skills, can be viewed to comprise of several abilities such as: observational abilities, emotional abilities, questioning abilities, imaginative abilities, inferential abilities, experimenting abilities, consulting abilities, argument analysis abilities and judging skills and deciding skills (Hitchcock, 2018). To date, various studies presented conflicting evidences on the effect of PBL on learners’ critical thinking ability.

Reflecting on this gap, My iDeaS which is designed as a mobile apps can help to increase understanding on how to strongly embed critical thinking skills in the PBL pedagogical approach. Also, it is important than ever in the context of education to provide a conducive learning environment where learners are encouraged to be curious, creative and active in asking questions that can facilitate them in doing effective problem solving. Without a teaching aids such as My iDeaS, it can be very challenging to transform a passive learner to become an active learner in the context of classroom T&L activity, particularly dealing with underprivileged Malaysian students including those coming from rural Sarawak, Sabah, Kelantan, Kedah and other places.

The Advantages of My iDeaS

From the education standpoint, business educators can greatly benefit from using the apps to strategize for effective T&L practices to ensure future business graduates are equipped with necessary skills that can meet the workplace of Industry 4.0. In this context, My iDeaS can be deployed in T&L practices using PBL pedagogical approach for business management courses. The apps can facilitate PBL activity and provides a stimulating online learning environment that develop and strengthen skills not just for problem solving, but also in the following domain areas such as: lifelong learning and critical thinking skills through the deployment of its Questioning Toolkit Module; creative thinking skills using its Visual Ideation Module; communication skills through the use of Smart Manager and My iDeaS Editor that can provide social connection between learners and external experts.

From the community standpoint, My iDeaS through the use of Smart Screen Control and Smart Manager modules can offer advantages to the external stakeholders relevant to a particular business courses, to be involved
in the learning process as an expert in preparing the future business graduates for their industry. My iDeaS also is shareable and scalable because the software architecture design leverages on cloud computing and database supports. Hence, its utilization is not just restricted for higher education sector, but also can be ideal as a training tool for strengthening problem solving and decision making skills. Hence, in addition to educators and learners, My iDeaS can be utilized by any decision maker, problem solver as well as researcher.

**Marketability of My iDeaS**

My iDeaS can be commercialized as an educational or training software tool. It is practical to be deployed as a teaching software in classroom setting. As a mobile apps, my iDeaS can easily reach wider mobile based market using online channels such as Google Play to market the product. This apps is currently designed as a software companion to teach Change Management course at Universiti Malaysia Sarawak.

**Acknowledgement**

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THE EFFICIENCY OF GAME-BASED LEARNING TOWARDS STUDENT’S FOCUS AND ENJOYMENT USING BOARD GAME: A CASE STUDY AT SK MARTIN

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Highlights: The purpose of this game research is to observe and evaluate how the implementation of the game-based learning (embedded with IT) can improve students’ focus in class and at the same time having fun with their study.

Keywords: Game-based learning, board game, primary school.

Introduction

Basically people playing a game when their have free time. What is game based learning? Game-based learning is a structure to complement traditional teaching strategies and infuse teaching with energy, spark innovative thinking and provide diversity in teaching method (Boyle, 2011). Game-based learning concept is healthy activities for the mind of students and supply learners with platform for their creative thoughts to bounce around. We have been instructed to find primary school, which has been listed, around Kota Samarahan to test our game board. Our group, Pavo Plumeria which consists of seven (7) members decided to go to SK Martin to test our game board. On 10 October 2018, we have been attending a meeting with Encik Tamiz, Penolong Kanan Kokurikulum of the school and discuss on the date when we will conduct the test. Our research subjects are among Year 6 students from SK Martin.

Purpose of Research

The purpose of this game research is to observe and evaluate how the implementation of game-based learning can improve students’ focus in class and at the same time having fun with their study especially by using game board learning with IT implementation in it. According to Forge (2018), adult students can also learn subjects in this innovative way. Non-traditional learners — students with children, military students, online learners, etc. — can mix academic theory and practical skills with the fun of playing a game.

We had prepared a few questions for the students to answer during the game which involving Science subject. The purpose of the questions is to help them with memorizing and better understanding the Science facts especially for those students who are from intermediate class. “According to Bruner, students who engage in hands-on learning and play-based activities experience the following benefits increased motivation, buoyed creativity, enhanced problem-solving skills, a greater sense of personal responsibility and the joy of autonomy and independence”, said Nott(2016). Some students might find that it is hard to memorize certain facts especially in Science with its own terms. According to Forge (2018), the best games teach important topics but keep students interested at all times.

Moreover, we have implement and use IT knowledge’s to come with the idea and preparations of the game which can exposed them to the current IT and explain to them what is IT. Besides, it can enhance their interest to study and know more about IT. From the journal written by Eric Zhi Feng Liu and Po-Kuang Chen(2013). It said that “Most studies on game-based learning have focused on digital game-based learning. Digital games provide animated graphics and audio effects as well as immersive stimulation. Lin and Liu (2009) included game mechanisms in typifying practice, inviting learners to beat their rivals. Furthermore, they can have a casual style class with less stress when using game-based learning. This can be proved through review from Gavin Cahill (2017) as he said “Game-based learning takes this same concept and applies it to teaching a curriculum. Students work toward a goal, choosing actions and experiencing the consequences of those actions. They actively learn and practice the right way to do things. The result is active learning instead of passive learning”. Our board game is easy to understand by those student as it has the same concept with snake and leader with a few modifications. Therefore, we believed that game-based learning can help them learn while having fun.
Problem Statement
Students are divided into three (3) categories which are from upper class students, intermediate students and upper class students in each schools. Based on observation, students from intermediate class and lower class have less interest in study especially in a formal way. They are much more preferable to practical which is indirect way of study compared to theory. When they are less interested in study due to the formal way of teaching, the probability that they missed out the crucial information on certain subjects and left far behind in study is high. This will lead them to do more practices and exercises to help them digest all the information especially subjects that required them to memorize formulas. Therefore, game-based learning is invented for the purpose of helping those students who have difficulties in study, so that they can learn certain subjects with fun and less stressful or borings (Yung, 2011).

Preliminary Investigation
Do you think game-based learning can help students in their study?
Majority of students agreed that game-based learning can help them in their study. Therefore, there is certain of them are not sure whether this kind of method is really can help them in studies. Based on previous studies, learning and teaching actually can be enhanced through educational games. It also can help student recall back what they have learned and attract their interest in studying (Eric Zhi Feng Liu, 2013).

Figure 1: Game-based learning can help students in their study?

Do you think that game-based learning can help students to focus in class?
Based on our responses, most of them answered yes that game-based learning can help students to be focus during class. This kind of approach was more effective in enhancing the learning effectiveness and attitudes of students to be more focus and to prevent them fall asleep during the learning process (Eric Zhi Feng Liu, 2013).

Figure 2: Game-based learning can help students in class?

In your opinion, does game-based learning study suitable to be implemented in education?
Majority of students did agree that game-based learning is suitable to be implemented in education. Researcher found that the educational games can enhance learning motivation, active participation, and concentration among students. Besides learning, students can also have fun and play among their classmate (Eric Zhi Feng Liu, 2013).
Would you prefer game-based learning or lecture-based learning type to study? Most of student preferred game-based learning rather than lecture-based learning in education. Based on research, learning with the game-based approach could assist students in gaining knowledge, furthermore it also can develop some interest among the students to learn new things or the things that they are not interested in (Eric Zhi Feng Liu, 2013).

After playing with our board games, do you think it is interesting? Based on rating of our game board interesting, majority of respondent interested with our game board learning.

The difficulty of the question Based on rating of our game board difficulty of questions, majority of respondent stated that the difficulty of question is average.
Research Design
For the design, we came to an idea to use living things which is part of the Science subject in year 4 until year 6 syllabus. While implementing the idea of ‘snakes and ladder’ game, we change the ladder to bamboo which implies living things and keep the snakes theme instead, so that the students can get a bit familiar with the game and get the clue behind the meaning of the images, what they are going to play later.

Figure 8: Our Design Game Board

Sampling
The objective of this section is measuring the impact of gamification or game-based learning in primary school student. Nowadays, gamification is increasingly being adopted in education as well, with newer learning games being developed to increase the interest of the learner especially among student. This also determine whether gamification in teaching and learning can improve the students’ achievement in Science subject in the primary school. This experiment divided by two categories which is Inexperienced Group (1st visit) and (Replay + Inexperienced) Group (2nd visit). This experimental study was done in a primary school called SK St. Martin located in D/A PPD Samarahan, Jalan Dato Mohd Musa, 94300, Kota Samarahan, Sarawak, Malaysia. Since this school is located in a rural area and small in scale, they have only one class for Year 6 students (26 students) to offer. In spite of, there are also 4 additional groups visiting this school, the available respondent is further reduced and distributed amongst the groups. The assigned respondents to our group are 7 students (5 males and 2 female) for the Inexperienced Group (1st visit) and 6 students (4 males and 2 female) for the [Replay + Inexperience] Group (2nd visit). Due to constraints, we are not able to take the same student for our second visit which is for the [Replay + Inexperienced] Group.

<table>
<thead>
<tr>
<th>Player</th>
<th>R</th>
<th>G</th>
<th>B</th>
<th>Y</th>
<th>P</th>
<th>Total Point</th>
<th>End Game Time</th>
<th>Elimination Time</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillary</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>10</td>
<td>44</td>
<td>-</td>
<td>-</td>
<td>3rd</td>
</tr>
<tr>
<td>Mizal</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>-</td>
<td>21</td>
<td>-</td>
<td>15 min</td>
<td>6th</td>
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<tr>
<td>Stanley</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>10</td>
<td>10</td>
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<td>20 min</td>
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<td>5th</td>
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<tr>
<td>Petruze</td>
<td>6</td>
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<td>Nazwir</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>20</td>
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<td>41</td>
<td>-</td>
<td>18 min</td>
<td>4th</td>
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<tr>
<td>Sharon</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>-</td>
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<td>20</td>
<td>20 min</td>
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<td>7th</td>
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<tr>
<td>Diana</td>
<td>5</td>
<td>8</td>
<td>-</td>
<td>35</td>
<td>20</td>
<td>68</td>
<td>20 min</td>
<td>-</td>
<td>1st</td>
</tr>
</tbody>
</table>

Findings and analysis

Question, (BQ) = Blue Question, (YQ)= Yellow Question, (PQ)= Purple Question.
For each color represent the difficulty level and point of the question:
Red = super easy question = 1 point; Green = easy question = 2 point; Blue = normal question = 3 point; Yellow = difficult question = 5 point; Purple = super difficult question = 10 point.
Table 1: Raw gameplay data of Inexperienced Group

<table>
<thead>
<tr>
<th>Player</th>
<th>R</th>
<th>G</th>
<th>B</th>
<th>Y</th>
<th>P</th>
<th>Total Point</th>
<th>End Game Time</th>
<th>Elimination Time</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillary (i+r)</td>
<td>3</td>
<td>12</td>
<td>9</td>
<td>15</td>
<td>10</td>
<td>49</td>
<td>18 min</td>
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<td>1st</td>
</tr>
<tr>
<td>Stanley (i+r)</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>35</td>
<td>18 min</td>
<td>-</td>
<td>4th</td>
</tr>
<tr>
<td>Petrus (i+r)</td>
<td>8</td>
<td>3</td>
<td>5</td>
<td>20</td>
<td>37</td>
<td>18 min</td>
<td>-</td>
<td>-</td>
<td>3rd</td>
</tr>
<tr>
<td>Andrew (i)</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>14</td>
<td>16 min</td>
<td>-</td>
<td>6th</td>
</tr>
<tr>
<td>Sharon (i+r)</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>-</td>
<td>30</td>
<td>48</td>
<td>18 min</td>
<td>-</td>
<td>2nd</td>
</tr>
<tr>
<td>Erica (i)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>10</td>
<td>18 min</td>
<td>-</td>
<td>5th</td>
</tr>
</tbody>
</table>

Graph 1: Efficiency of student in answer the question for inexperienced group

Table 2: Raw gameplay data of Replay Group[r]+Inexperienced Group[i]

<table>
<thead>
<tr>
<th>Player</th>
<th>R</th>
<th>G</th>
<th>B</th>
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</tr>
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<tbody>
<tr>
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<td>3</td>
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<td>9</td>
<td>15</td>
<td>10</td>
<td>49</td>
<td>18 min</td>
<td>-</td>
<td>1st</td>
</tr>
<tr>
<td>Stanley (i+r)</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>35</td>
<td>18 min</td>
<td>-</td>
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<td>9</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>10</td>
<td>18 min</td>
<td>-</td>
<td>5th</td>
</tr>
</tbody>
</table>

Graph 2: Efficiency of student in answer the question for Replay (i) + inexperienced (i) group

Achievement Rate

<table>
<thead>
<tr>
<th>Player</th>
<th>1st Visit Achievement Rate [%]</th>
<th>2nd Visit Achievement Rate [%]</th>
<th>Player Pos.</th>
<th>Achievement Rate [%]</th>
<th>Rank</th>
<th>Achievement Improvement [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hillary</td>
<td>72%</td>
<td>78%</td>
<td>3rd</td>
<td>1st</td>
<td>+5%</td>
<td></td>
</tr>
</tbody>
</table>
Proceedings of the International University Carnival on e-Learning 2019

Table 3: Students’ achievement rate based on students who replay our board game in 2nd visit

<table>
<thead>
<tr>
<th></th>
<th>Inexperienced Group</th>
<th>Replay Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Gender</td>
<td>5 Males, 2 Females</td>
<td>4 Males, 2 Females</td>
</tr>
<tr>
<td>2) Time taken to complete a game</td>
<td>20 minutes</td>
<td>Less than 20 minutes</td>
</tr>
<tr>
<td>3) Gameplay</td>
<td>100% enjoyable</td>
<td>100% enjoyable</td>
</tr>
<tr>
<td>4) Promote learning</td>
<td>98% Yes</td>
<td>98% Yes</td>
</tr>
<tr>
<td>5) Question difficulty</td>
<td>56% Difficult</td>
<td>50% Difficult</td>
</tr>
<tr>
<td>6) Rules simplicity</td>
<td>80% Simple</td>
<td>95% Simple</td>
</tr>
<tr>
<td>7) Game satisfaction</td>
<td>100% Yes</td>
<td>100% Yes</td>
</tr>
<tr>
<td>8) Game enhancement section</td>
<td>85% Question difficulty, 67% Game rules, 81% Game graphic, 30% Types and effects of utility card, 80% Player number, 50% None</td>
<td>70% Question difficulty, 33% Game rules, 91% Game graphic, 50% Types and effects of utility card, 75% Player number, 50% None</td>
</tr>
</tbody>
</table>

Games as a motivating learning tool. Why do games work?

Games are enjoyable and interactive and learners respond naturally to this type of learning dynamic. If learning is to occur, students must be motivated to learn (Calaoun, 1980). Maslow (1943) identified a hierarchy of five levels of needs (Brooks, 2006). These needs are represented in a pyramid to indicate a thinning out of needs with progression through the pyramid. Maslow claims that individuals will only be motivated by the next unattained level. Thus when all the base level physiological needs are meet individuals are then motivated by safety needs. Games have the effect of offering learner’s safety in numbers when the games run on a paired or grouped basis. The next level which will motivate learners is social or affiliation needs and games naturally offer a medium for developing and satisfying student’s social needs. They are naturally drawn together and bond in the comfortable competitive environment of the game, it is almost impossible to sit passively and not become involved in games, particularly when they are entertaining. Ruben (1999) substantiates the authors claim that games can motivate students to learn from a social or affiliated need when he claims that games offer an opportunity to promote collaboration and fosters active learning. The comfortable competitiveness of the game offers a motivating incentive for students at the next level of Maslow’s theory, ego or self-esteem. Mann (2001) discusses how students may feel alienated from the learning based primarily on rigid teaching practices. Games can work on integrating students and fostering a creative and social learning environment (Deborah Kirkland, 2010).

Games help students develop necessary knowledge, skills and values in order to be an active member of their classroom and even in their society. At that point, teachers have a crucial role on students’ learning process with games. When teachers choose appropriate games related to their teaching goals and when they organize GBL process effectively, permanent learning can be provided, courses can be found enjoyable and interesting by learners (Gözü̈ok, 2000). However, students who are from elementary schools, have difficulties to concentrate abstract concepts. That’s why educational games are usually prepared for elementary school students (Sevi̇nc, 2004). Moreover, games are based on student-centered education approach, students learn by doing and experiencing with interactive practice (Ucus, 2015).

Students Feedback

As for our board game feedback we use observation techniques. We decided to choose this method because we worried that Year 6 students cannot adapt with the questionnaires method. The feedback is based on our observations from the overall gameplay. Therefore, through this observation we came out with own assumption data. The findings below show a data of our assumption based on our observation for both gameplays.

Students Feedb

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</tr>
</tbody>
</table>
Application of games Shanahan et al (2006) identify five key characteristics, based on research, of effective inclass games. These include the game must relate to the learning outcomes; teacher and students must quickly understand how to play the game; the game must not become more important than the learning; the game must motivate students to perform better; and finally students must be able to provide feedback to the teacher on the game. In terms of this paper the researchers were cognizant of these five characteristics when planning and implementing both games. All questions in both games related directly to the module learning outcomes and content. The game was used for the last twenty minutes of tutorials once a week, thereby ensuring the game never took precedence over the learning and content. Analysis of student results and qualitative feedback from the students supports student improved performance. Student feedback from the first game experience informed the second game application (Deborah Kirkland, 2010).

Research on Flow Theory Related to Game-Based Learning
Besides educational game studies that investigated important gameplay variables such as motivation, engagement and content area learning gains, recent years some researchers have also begun to examine students’ gameplay experience using the flow theory proposed by Csikszentmihalyi (1975). This movement towards examining players’ playing experience in the game environment is driven by the increasing awareness of the critical role that students’ enjoyable playing experience (i.e., game flow experience) has on students’ learning, as have discussed in the previous chapter. The importance of students’ perceptions of their gameplay experience for the design of effective educational games is another reason why flow experience in the game environment has been receiving more attention among the research community. Specifically, examining students’ playing experience from the flow theory perspective will inform educational game design because game flow studies usually examine important game design features that lead to students’ enjoyable playing experience (Zheng, 2012).

Game-based Instructional Design
There have been several notable theories and frameworks for connecting game design elements to instructional content. De Freitas and Oliver (2006) examine how exploratory learning games and simulations can be integrated into a curriculum in a manner that accounts for learning context, learner specification, pedagogic considerations, and the mode of representation. Woods (2004) discusses elements of games that can most appropriately be used for education. Gee (2003) has similarly made recommendations of game elements that should be integrated into educational experiences more frequently as part of learning literacy. These works, while noteworthy in matching learning content to various game elements, do not account for the incredibly diverse gameplay capabilities and experiences of players. While there has been a growing interest in designing adaptive game systems that dynamically change according to player tactics and styles (e.g., Ponsen, 2004; Spronck et al., 2004), further emphasis on adaptive game elements is needed within the space of educational games (Perry, 2016).
Conclusions Interpretation of Results

Based on the result that we get, students enjoy more when playing the games while studying. They tend to focus more and learn from their mistakes. They can generate a better thinking skill when they are playing the game while studying about new stuff. The tendency for the student to make silly and simple mistakes when answering the question is small. They prefer to answer it among themselves and in group. They like to discuss about it and tolerate among them. For the data that we get from the public review, they also like it very much. They found it easy and would like to recommend it to their children. They can think of a way on how to improve their children’s thinking skill. They are very sure, by using this board game their children can improve their IQ easily and within a short period. They can teach their children anywhere and anytime they want to as long as the board game is with them.

Recommendations

In future, we hope that our board game can help many students to improve their understanding about science. By using this board game, the percentage of students that will hardly to understand about this subject will decrease. We will also would to improve our board game in the future as to fulfil the students need in order to upgrade it to the next level of understanding. We would also like to make a new board games for the other subject that we find it is hard for the student to understand. By collecting some feedback from the students and the parents, by observing how well they know about this board game and the difficulty on how to play the board game. We would also like to make the board game more interesting in terms of the picture, graphics and the icons. The rules that we are planning to improve is that it is easy to understand and it is not that complicated.

Acknowledgement

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References

Games are an effective way of educating the public / students to understand a science. In astronomy for example, this requires knowledge of the movement of the celestial objects. This knowledge requires theory and practical experience. Our product called Kembara Alam Hartawan Falak or called Al-KAFH is an attempt to expose, understand and promote the field of astronomy or falak among the general public and students in particular. In these games students are exposed to the science of astronomical science and management of faculties. For example, facilities management of related institutions such as observatories, space centers, planetariums, science centers and mufti offices. Indirectly playing the game, the community can learn astronomical science as casually and manage financially as well. In addition, the game promotes in astronomy field and its related agencies to make the community more aware and closer to astronomy/falak management in Malaysia. This product also has a positive impact and has a good chance of being marketed.

Game is one of the fun way to understand knowledge. Astronomy/falak is science subject which is interesting and easier to memorize when it is delivered in the form of game. A lot board game in market such as saidina, monopoli, chess and flashcard. So we developed Al-kafh which is the first product of astronomy game as such in Malay language.

About the Game
The invention is novel and different from what we can found in the market. The game is full with astronomy facts and figures. The player will also learn the management related to falak along the journey. They required to equipped the best facility for their own observatory for better return of investment. The fact & fate card will make the game more adventurous and full of knowledge. Consequently, QR codes are created for each of the observatories so players will be linked to the official websites and access full information about the observatories. This will promotes the astronomy institution in order to raise public awareness in astronomy institution in malaysia.

Originality and creativity.
The invention is original and different from what is found in the market. No in market. This is first product in Malaysia and world.

Practically and Usefulness
The product is ready to sell and 5 product produced. 17 product already booked.

Status of Innovation
Evidence that product has been granted Intellectual Property (IP) Status which is copyright (LY2019003610). The idea this product also come from thesis student degree already publish. Paper also publish tabayyun.

Contribution to society
The invention is in accordance to society/public viral hoax issue such as flat earth, moon rotating the kaabah marikh become bigger or same size with moon and so on. Another reason one of way to understand my subjek management in falak. So this is easy way to learn falak instead of reading. Base on my teaching they love to play rather than learn in class. I were taught astronomy, such as pengantar falak [mooc unisza], pengurusan falak and kosmologi. This subjek is needed game before we bring them a outside to stargazing example. Target market is school children, institute university and also public.

Conclusion
We have good comments and respond from gov and non government such as researcher, teacher, student and private. So most of them agree and very interested to have Al kafh. They hope can buy with the lower price and suggest very good idea.
References
HUMANIZING CLASSROOM TOOLKIT – A PLANNING APPS FOR EDUCATORS TO ENVISION THEIR FUTURE CLASSROOM

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Highlights: Humanizing Classroom Toolkit is an apps that is designed as a planning tool for educators to systematically plan, organize, lead and control their approaches in transforming their old ways of teaching and learning practices in order to disrupt a traditional classroom setting. This apps is constructed using the philosophical approach of social constructivism and its framework encapsulates fundamental principles, derived from Scholarship of Teaching & Learning processes, Design Thinking Approach and Bridges’ Transition Model. Educators can deploy the apps as a strategic reflection tool for their thinking process to envision their future classroom for all students, including underprivileged students.

Keywords: Humanizing Classroom, design thinking, change management, underprivileged students

Introduction
“Humanizing Classroom” is a framework that encapsulates fundamental principles, derived from Scholarship of Teaching & Learning (SoTL) processes, Design Thinking Approach and Bridges’ Transition Model (Bridges, 1986; Bridges and Mitchell, 2000) to research and understand T&L practices and approaches in the classroom context. This framework is transformed to become a planning apps to assist educators who are struggling to change their old ways of delivering teaching and learning (T&L), and facing a difficult task to evaluate whether the existing T&L approaches that they practice, have positively impacted on their students’ learning and equipped them with the right skills for Industry 4.0 workplace. Users can gain benefit from using this apps as a strategic reflection tool. Educators as the user of the apps will be guided on how to systematically manage changes by doing effective planning, organizing, leading and controlling matters that are relevant to their classroom T&L practices and activities, without leaving anyone behind particularly the underprivileged students.

Description of Innovation

Figure 1: Humanizing Classroom Toolkit
Humanizing Classroom Toolkit comprises of four components, namely: Transition Space, Design Space, Learning Activity Space and Reflection Space. The following provides details of these four components:

**Transition Space**: Integrating Bridges’ Transition Model, the user will map their change journey through three phases – Ending Phase, Neutral Zone & Beginning. Ending phase emphasizes on disrupting the old practices, and prepares a transition for change. Neutral zone is where the transition towards a new reality is happening, and can be the most difficult phase to manage. Beginning phase is where the new reality takes place and the change behavior is sustained.

**Design Space**: Using Design Thinking approach that contains five stages – Emphasize, Define, Ideation, Prototype and Test –, the user will set their objectives to attain in each stage to innovate their T&L practices. Emphasize and Define stages should give focus towards understanding learners’ needs and leaving no one behind. Ideation of Design Thinking will give focus to develop potential creative solutions to help learners. Finally, Prototype & Test stages are about providing, refining and implementing solutions developed to solve problems or issues related to the user’s T&L change journey.

**T&L Activity Space**: This space is for planning and organizing T&L activities in classroom context, and align these activities according to Transition Space and Design Space.

**Reflection Space**: This space is prepared for user to do critical self-reflection on their change journey and achievements as well as failure. The elements of leading and controlling are fundamentals in the exercise of doing reflective thinking as input in the reflection space.

**The Importance of Humanizing Classroom Toolkit**

From the perspective of underprivileged students, they are facing various forms of barriers that can hinder their potential to be successful not just academically, but also in securing future employment. In the era of Industry 4.0, continuous disruptions due to digitalization and breakthrough innovations not just reconfigure industry structures, supply chain activities, business models and processes, but also shaping workplace interactions and culture. As an educator, it is important to acquire deeper knowledge about these students and how to facilitate their learning to ensure they can gain expected level of competencies in areas related to problem solving, communication, teamwork and leadership skills, as well as adaptability to changes as future workforces of Industry 4.0. Converting “Humanizing Classroom” framework to become an apps - Humanizing Classroom Toolkit – highlight the importance of this innovation idea to respond to the above scenario by providing solutions to ensure these underprivileged students will not leave behind.

In the context of educators, the apps can facilitate them to systematically map the flow of changes and anticipate certain challenges earlier on, so that they can better prepared mentally and physically. Humanizing Classroom Toolkit can permit educators particularly those who are not trained in the education field, to be well
prepared with the anticipated changes, and address the human issues about the feeling of being inadequate or insecure through doing good reflection exercises. It is widely recognized that feeling inadequate and insecure can negatively impact on psychological and emotional well-being, and can also contribute to low productivity and morale.

**The Advantages of Humanizing Classroom Toolkit**

As a strategic reflection tool, Humanizing Classroom Toolkit provides a logical view to anticipate changes about an educator’s journey to transform T&L practices. In the change process, they can envision their future classroom, for example to be flexible, fun, interactive, use of ICTs to support “Anytime-Anywhere Learning”, and “real world” can be found and learned in class. Then, using the apps, they can plan, organize and deliver their course content and T&L activities to realize their vision.

Humanizing Classroom Toolkit derives from the framework that emphasizes on student-centred learning environment. By recognizing that learning has to contain certain elements of fun, active and flexible for example, the delivery of the course that is well organized no doubt can impact students positively.

**Marketability of Humanizing Classroom Toolkit**

This app can be commercialized as a training software tool for educators who need helps in transforming their T&L practices.

**Acknowledgement**

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**References**


UMP GLOBAL CLASSROOM: BEYOND BOUNDARY LEARNING

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Highlights

Global Classroom is a contemporary teaching paradigm which is beyond classroom boundary, regardless of geographical, time zone, languages and cultural barriers. This initiative is a form of cyberogy which uses Information and Communication Technology (ICT) to create learner centred, autonomous and collaborative virtual learning environment, so that they can participate and collaborate with peers from other countries. Embedding Global Classroom elements into class activity could provide opportunities for students to boost their understanding of various fields, adapt cross cultural team-working and to help them acquire specific skills in different perspective. Global Classroom is an actively engaged partner program initiated by Centre of Instructional Resources & e-Learning (CIReL) UMP. The main target of Global Classroom is to expand the matrix beyond the conventional physical classroom with the integration of online learning platform, flipped learning, long distance education and simultaneous classroom. UMP Global Classroom is a progressive initiative to embraces globalised online learning (GOL) through basic, standard and advanced modes. The benefits of Global Classroom courses are immense. For many students, such courses are their first or only opportunity to experience direct international communication and interaction. The virtual exchanges at the heart of the courses can act as an alternative to physical mobility or preferably, a supplement to it, either by preparing students for future travel or maintaining previously established connections. The interactions provide opportunities to practice communication skill acquisition while also boosting the student’s levels of intercultural and global competence. For course instructor, Global Classroom also create a global platform to promote and market the niche research and competence skill with international partner which could enhance collaboration in terms of innovation in teaching and learning, research and publication. Finally, they provide a broad platform for engaging student’s digital and media literacy, giving them a chance to develop communication skills that have become a vital element of the social and business world. Since the launching of Global Classroom in UMP in 2016, this initiative are well accepted and quick implementation with simple instructional strategy. Up to date, Global Classroom had engaged UMP with 39 universities from 18 countries and beneficial to more than 1500 students in basic Global Classroom. In next milestone, UMP are moving into standard and advanced Global Classroom to increase the virtual engagement align with substitute blended learning.
SMOKE-NOT-KING: SMOKING AWARENESS BOARD GAME

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Highlights
Smoke-Not-King is an innovation board games created to achieve the same goal of increasing the development of knowledge and information especially among communities with addition knowledge regarding risk of smoking. The Acts, fines and campaigns are provided in the form of games in this product that can make players are more likely to remember and thus influence good attitudes in smoking risk awareness, especially to children and teenagers. This product has good potential in ensuring that smoking risk awareness can be delivered indirectly in the form of a fun game. With low cost, players can get information on the smoking risk, recommended solution while also change the perspectives on smoking behaviour and consequently affecting their own attitudes.
I-GHARAR

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Highlights:
Islam has clearly forbidden all business transactions, which cause injustice in any form to any of the parties. One of the negative elements in the transaction is gharar. Gharar is an Arabic word (غرر) which carries meaning of uncertainty, deception and risk. It is a negative element in the transaction like riba (usury) and maysir (gambling). Gharar is a relative concept when it comes to uncertainty, risk and hazard with a certain level of uncertainty being tolerated. Therefore, in order to give right understanding to students in the effort of producing ideal Muslim students, there is an urgent need to develop handy and attractive applications (apps). The innovation is based on learning through the applications is concentrating on teaching and learning the negative elements in the transaction namely gharar for community. In order to achieve this objective, the researchers focused on benefits from mastering community in the field of modern technology and smart application for more effective and fun learning.

Keywords: gharar, teaching, learning, innovation

Introduction
Gharar is an arabic (غرر) word that is associated with uncertainty, deception and risk. There are various definitions of gharar given by scholars. This disagreement arisen when there is no direct prohibition in the Qur'an and the hadith of the Prophet are in the form of examples of transactions that contain elements of gharar. There is no verse in the Qur'an that specifically clarifies the legal status of gharar or its details. However, the Qur'an states a general rule that applies to all the detailed cases of gharar mentioned by the jurists. The rule is the prohibition of consuming people’s property

And do not consume one another’s wealth unjustly (bil-batil) [al-Baqarah: 188]. And He says “O you who believe, do not consume one another’s wealth unjustly; rather, [all transfers of property should] be trade by mutual consent.” [al-Nisa': 29].

Very reliable narrators have reported from a large number of sahabah of the Prophet [peace be upon him] forbade sales involving gharar. These hadith forbid certain types of gharar sales; for example: Sale of the unborn animal in its mother’s womb (bay habl al-halabah), two sales in one, a pebble sale (bay’ al-hasah), a touch sale (al-mulamasah), a toss sale (al-munabadhah), sale of the of birds in the sky and fish in the sea. There are forms of gharar sale that were not mentioned in hadith but were mentioned by jurists.

Gharar is a negative element in the transaction like riba (usury) and maysir (gambling). It is used to measure the legitimacy of a hazardous sale or risky investment pertaining to either selling of goods or assets of uncertain quality or delivery or contracts that are not drawn out in clear terms. Islam has clearly forbidden all business transactions, which cause injustice in any form to any of the parties. In financial contracts gharar may lead to injustice, exploitation and enmity among contracting parties. The rationale for the prohibition of gharar is to ensure full consent and satisfaction of the parties in a contract. Without full consent, a contract may not be valid. Full consent can only be achieved through certainty, full knowledge, full disclosure and transparency.

Content
E-Learning Teaching tool that provides information on prohibition of gharar.
Flexibility to learners, not limited to specific places and times.
I-Gharar is beneficial towards the usage of implementation of shariah compliant transactions.
Effective style of learning and teaching by applying an interactive collaboration.
Flexible learning with two way text-based online chat, which is widely used in e-learning.
Multi device support of mobile learning in education.

References
PEER-DRIVEN LEARNING PEDAGOGY VIA DYNAMIC BRAINSWEEPER

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Highlight: The learning approach is a way increasingly worldwide and is picking up pace these days. A modern teaching uses a technology to drive the education system. Being aware of the advance technology, usage of the digital systems was incorporated into learning environment and capable to impart teaching and learning processes. Game-based learning is one of the opportunities that impart both teaching and learning process. A well-structured educational game could merge the learning objectives of the educational system with a product of custom commercial game by improving flexibility and creativity. The aims is not solely to support the industrial revolution 4.0 in education, but promotes effective and interactive learning despite to inspire skills and builds emotional connection to learning experience. This approach not only enhance student interaction and bring leisure in education but also aids their learning process via self and peer-directed learning and acts as a tool that provokes higher level of learning skills.

Keywords: Game-based learning, peer-directed learning.

Introduction

The learning approach is a way increasingly worldwide and is picking up pace these days. A modern teaching uses a technology to drive the education system. Being aware of the advance technology, usage of the digital systems was incorporated into learning environment and capable to impart teaching and learning processes (Hwang and Wu, 2012). Finding an alternatives as to replace dull learning environment as to engage learners is the primary issues. Studies shows assortment of activities, rewards, surprises and human interactions capable to retain learners’ enthusiasm for learning. Game-based learning (GBL) is one of the approaches that impart both teaching and learning process. The information and knowledge procured through game-based learning are held longer than information from conventional learning techniques (Wu et al., 2015). So as to make learning compelling, GBL requires recreations that are well planned and have all around actualized learning tasks.

A well-structured educational game could merge the learning objectives of the educational system with a product of custom commercial game. Brainsweeper is a GBL which integrates knowledge matter of subject which align with learning outcomes into commercial prefabricated games by improving flexibility and creativity. The aims of Brainsweeper GBL is not solely to support the advancement of the technology and industrial revolution 4.0 in education, but to promote effective and interactive learning despite to inspire skills and builds emotional connection to learning experience (Buckley and Doyle, 2016). Several key aspects of Brainsweeper GBL are level of questions could be adjusted according to their level of studies and each student receives immediate feedback on their performance with suggestions on how they might improve. This pedagogy includes chance and first aid cards which resembles the real-life situation; i.e: in medical about the diseases and drugs also give them chances to perform their task which related to their curriculum thus polish their psychomotor skill and develop their self-esteem. This pedagogical approach in which player’s position is based on luck but in different point of view its imitate small group discussion. This peer-driven learning tool provokes higher level of learning skills. The perception of two primary stakeholders which are student and teacher were obtained and showed positive feedback. This approach not only enhance student interaction and bring leisure in education but also aids their learning process via self and peer-directed learning. GBL offers unique opportunity to assess student learning thus reflecting the achievement of the course learning outcome of the institutions. Instead of assessing the performance of the players under specific institution, this GBL approaches can be used nationwide which subsequently set a benchmark of the knowledge level for the dedicated groups of subjects and promotes healthy learning culture. Replacement of dull learning spaces with GBL promotes effective learning which possibly ensures high performance of learners especially the millennial generation of the global era.

References

ACQUISITION OF KNOWLEDGE THROUGH MAQASID SHARIAH QUALITY OF LIFE ASSESSMENT APPLICATION (EMSQOL)

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Highlights: Maqasid Shariah Quality of Life Assessment (eMSQoL) Application is designed for users, individuals and organizations, to assess their quality of life based on Maqasid Shariah approach using Web-based and mobile application. eMSQoL identifies and suggests aspects of improvement to enhance users’ quality of life (QoL). eMSQoL index is categorized into five categories: excellent, good, moderate, low and poor. eMSQoL index report is a strategic element that could be used by individuals as self-reflection to achieve happiness, whilst organization could use the report as an indicator to select, hire and retain employees.

Keywords: Maqasid Shariah, Quality of Life, Maqasid Shariah Quality of life, Assessment, Application, Maqasid Shariah Quality of Life index.

Introduction
Quality of life (QoL) embodies overall happiness. It is important to enhance individuals’ QoL because it could improve productivity and performance. Maqasid Shariah Quality of Life (MSQoL) was developed to address the gap in Maslow’s Hierarchy of Needs approach of measuring QoL that focuses only on the needs and wants. MSQoL approach addresses other aspects which are justice, spiritual and public interest, in addition to needs and wants (Dzuljastri et al., 2013). The effort to apply Shariah in measuring QoL is the Jihad to uphold the command of Allah SWT protecting Religion, Life, Mind, Lineage and Property as mentioned by al-Ghazali (1901). Measuring QoL using Islamic principles of Shariah is a holistic approach to bestowed blessing and prosperity (rahmatan lil-alamin). Obeying the command to protect the five elements of Maqasid Shariah (Religion, Life, Mind, Lineage and Property) is very important to ensure that all individual’s needs, wants and other life aspirations can be fulfilled in order to attain happiness and prosperity in this world and the hereafter.

Innovation Description
Maqasid Syariah Quality of Life Assessment Application (eMSQoL) is designed for the end users, individual or organization, to assess their QoL using Maqasid Shariah approach, consisting of five elements: Religion, Life, Mind, Lineage and Property. eMSQoL identifies and suggests aspects of improvement to enhance the user’s QoL. Parallel with the Industrial Revolution 4.0, eMSQoL provides unprecedented opportunities to both individuals and organizations using Web-based and mobile application assessing their QoL. The eMSQoL algorithm was developed based on the application of Principal Component Analysis, Univariate Clustering and Multiple Linear Regression as a supervised pattern recognition modelling technique.

What is the context or background of the innovation / product development / design / process?
eMSQoL was developed to assess ones’ happiness receiving blessing and prosperity (rahmatan lil-alamin) from Allah SWT, aspired by every Muslims. The endeavour could be achieved by identifying ones’ aspects of MSQoL that require improvement. Items manifesting the different aspects of MSQoL (Religion, Life, Mind, Lineage and Property) were derived from al-Quran and As-Sunnah. MSQoL index categorised users into five different status: excellent, good, moderate, low and poor.
Importance to Education

importance to education relates to the context of education for Muslims to achieve rahmatan lil alamin (prosperity and blessing). The output of eMSQoL provides new knowledge to users in terms of aspects of MSQoL to be improved. Individuals could acquire new, or modifying existing, knowledge and behaviors based on eMSQoL output. In addition, the findings from eMSQoL contributed to the body of knowledge. There are views stressing that any discussion about the protection of the five aspects of Maqasid Shariah has to follow the order mentioned by Imam al-Ghazali: protecting religion, life, mind, lineage and property. However, according to Chapra (2008), there are other views stating that the order is not necessary to be followed. Moreover, according to him, Fakhr al-Din al-Radzi categorized protecting life as the first aspect in the discussion of preserving the maqasid Shariah. Furthermore, according to him, Imam Shatibi did not always follow the order suggested by Imam al-Ghazali. The order or the aspects of Maqasid Shariah can change according to the aim or goal of the discussion. eMSQoL results supported the argument postulated by Imam Shatibi.

Novel, usefulness and Social Impact

Figure 1 provide the summary of novelty, usefulness and social impact of eMSQoL. The items manifesting the different elements of MSQoL derived from Al-Quran and Al-Sunnah contributed to the novelty of eMSQoL. eMSQoL benefited both individuals and organizations. Individuals could use the output of eMSQoL as self-reflection and get new knowledge on improving their QoL. Organizations could use the eMSQoL report as a strategic tool for recruiting, hiring, evaluating and retaining employees. The three-prong spill-over effects of eMSQoL are individuals could achieve happiness; organisation could improve productivity and performance; and improve socio-economic wellbeing.

Figure 1: Advantages, Usefulness and Social Impact of eMSQoL

Awards

Gold Medal Award, Minggu Penyelidikan Inovasi (MPI) 2019
Gold Medal Award, the International Invention, Innovation and Technology Exhibition (ITEX 2019).

Publication

Journal

Books
Kualiti Hidup Pendekatan Maqasid Syariah (2014), Penerbit UniSZA.
Quality of Life Maqasid Shariah Approach (2016), Penerbit UniSZA.
Penerokaan Pengukuran Kualiti hidup Maqasid Syariah (2016), Penerbit UniSZA.
Exploring The Measurement of Maqasid Shariah Quality of Life (2016), Penerbit UniSZA.

Commercial Values
eMSQoL was registered under Copyright category with the Intellectual Property Corporation of Malaysia (MyIPO) and the copyright number is LY2019001962. Individual users would be charged RM10.00 for eMQoL personalised report. On the other hand, consultation fees would be charged to organization users depending on the type of the eMSQoL report. Negotiation with organisational users takes place preceding the use of eMSQoL.
eMSQoL was awarded Gold Medal in the International Invention, Innovation and Technology Exhibition (ITEX 2019), which recognised the potential of commercialization of the product.

Acknowledgement
eMSQoL is the outcome of the Niche Research Grant Scheme (NRGS), Ministry of Education Malaysia.

References
EMBRACING INDUSTRIAL REVOLUTION 4.0 WITH LOW-COST, EXTREMELY EFFICIENT AND HIGHLY ADVANCED DIGITALIZED ASSESSMENT SYSTEM.

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Highlights: Assessment lies at the core of the learning experience; how students are evaluated shapes their comprehension of the educational program and decides their ability to progress. In the meantime, the assessment cost, workload and the quality of the assessment items pull into consideration of many institutions. In the era of advance technology, we should have explore on how technology can be used to ensure the assessment and feedback processes are agile, streamlined and capable of supporting high quality education. Due to that, digitalized assessment system (DAS) was developed and tested. The intention of DAS developed is not solely to support the industrial revolution 4.0 in education, but to provide learners, educators and wider institutional stakeholder a better used of technology in enhancing the overall educational experience; by improving flexibility and creativity in assessment system. Not only that, the output obtained from the assessment can be collated and analysed further for quality assurance and curriculum review processes.

About the Innovation
Assessment is considered to be the heart of the learning experience. The method of assessment used not only creates student’s understanding about curriculum but determines their ability to progress (Starkey et al., 2011). The assessment cost, workload and the quality of the items in the assessment pulls an attention of many institution. In the era of advance technology, we should have question, what contribution can technology make to ensure the assessment and feedback processes are agile, streamlined and capable of supporting high quality education (Stödberg, 2012). Due to that, digitalized assessment system (DAS) was developed and tested. The aim of DAS developed is not solely to support the industrial revolution 4.0 in education, but to provide learners, teachers and wider institutional stakeholder a better technology in enhancing the overall educational experience; by improving flexibility and creativity in assessment system. DAS shows how available technology can enhance assessment simultaneously evaluates the outcomes in order to increase efficiency of teaching and learning processes. Making used of widely available technology, DAS was created and introduced as to adds reflection into the process of assessment and outcomes evaluation. The digitalized assessment become more versatile as audio and visual experiences are incorporated into the assessment process, not only to gain student retention and so to enrich their learning experience. From the outcomes points of view, DAS provides valuable evidence to support the validity of qualification, course validation, resource allocation and curriculum review.

The archive of the assessment makes the outcomes of particular assessment reliability check possible and differences of the learners achievement would be observable. The effectiveness of the marking system and data management brings pedagogic advantages as the reduction in the workloads tunes the focus on the learner’s understanding and assessing the quality of the assessment items itself. The perception of two primary stakeholder; academics and students, was obtained. Based on the evaluation, it shows that student are more engaged with the system. Also, based on the feedback obtained through evaluation, it shows that student are satisfied with the assessment method provided by this system in addition to the workload reduction for the management. Several limitation in implementing this system as it is still in infancy which require more study to assert evidence on its reliability with requirement of digitally informed leadership. Through pilot study, this system have high social impact for all level of the stakeholder.

Acknowledgement: We thank you our top management of the faculty and colleagues who provided supports, insight and assistance in the study, by which their comments in the earlier version greatly improves the components of the study.
References:
THE ULTIMATE MATH PROJECT: INTEGRATING ART AND MATHEMATICS

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Highlights
The Ultimate Math Project is an illustrated book designed for young learners to enhance their interests in learning Mathematics. The problem solving tasks in this book challenge children to search new mathematical knowledge through digital technology while concurrently fuelling their imaginations. Learning mathematical concepts can be fun by injecting some art elements. This innovation is inspired by the works of many teachers around the globe with one ultimate goal – to make learning mathematics be enjoyable and develop self-belief and stamina in solving more challenging problems.

Introduction
Mathematics is globally considered as a difficult subject which caused many negative emotions (Bed, 2017). Students with anxiety towards mathematics tend to sustain an aversion to the subject regardless of its usefulness in everyday life (Johnstone et al., 2014). One of the main challenges to mathematics teacher is to instil a positive attitude in students toward learning mathematics (Gerald, 2014). By incorporating art into STEM (Science, Technology, Engineering and Math) education can help nurture students’ curiosity and help them develop creativity, problem solving and critical thinking skills. Arts contribute amazingly well to learning because they regularly combine the three major tools that the mind uses to acquire, store, and communicate knowledge: motor skills, perceptual representation, and language (Bequette and Bequette, 2012). Thus, we propose The Ultimate Math Project (TUMP) as a creative approach designed for young learners to enhance their interest in learning mathematics. The main objective in developing TUMP is to provide an engaging and exciting way of teaching and learning in learning mathematics. Numerous research and empirical evidence indicates that young learners become easily motivated when mathematical connections are presented in ways which relate to their experiences by triggering their natural curiosities (Fenyvesi et al., 2015). Ultimately, arts and playful activities can be an effective way to grasp the complex relationship between mathematics attitudes and joy of learning and support the students in their study achievements (Marja-Liisa, 2001).

TUMP is an illustrated book that features minimal instructions to describe mathematics-related task in each page. The book acts like a personal journal whereby the young learners are free to fill the pages based on their creativity and imagination. Relevant information can be accessed via TUMP’s Youtube channel provided by the authors. More interestingly, the finished work can be shared on the internet to inspire other young learners all over the world. Through art, the young learners are able to develop interest in mathematics, boost their confidence and enjoyment towards the learning of mathematics.

References
MASSIVE OPEN ONLINE COURSE (MOOC): INTERACTIVE ARCHITECTURE LEARNING THROUGH AUGMENTED REALITY ENVIRONMENT AND COLLABORATIVE GAMING – (AR)CH+

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Highlights: People are surrounded by Built Environment in everyday life but not many are familiar with the term, especially Architecture. Massive Open Online Course (MOOC), under UNIMAS Faculty of Built Environment will give a platform for public to have an overview of Built Environment related domains and issues. This course will be integrated with Augmented Reality (AR) technology as one of its learning tool. AR technology provides new possibilities for education as it is providing intriguing learning experience and able to increase students’ motivation to learn. AR Gaming will be also introduced to encourage collaborative learning environment among the students.

Keyword: Augmented Reality, AR Gaming, Education, Architecture, Built Environment, Massive Open Online Course

Introduction
In Built Environment, architecture can be identified as the combination of art and engineering. While the engineering components will make a building practical, the element of art in architecture will make it interesting and engaging. In education, the learning of architecture could be interesting and engaging as well, for student to grasp the essence of architecture.

Massive Open Online Course (MOOC) is Web-based educational program which allow participant from all over the world to enroll the learning courses. Faculty of Built Environment, University Malaysia Sarawak (UNIMAS) has planned and will be offering MOOC and it is called as “The Built Environment”. Under “The Built Environment” MOOC, an interactive architecture learning will be introduced here, which named as (AR)CH+. In learning Unit 1: Introduction to Built Environment, students will be using (AR)CH+, the online e-learning platform powered by Augmented Reality (AR) technology which allow them to learn on the history of architecture and architectural characteristics of some famous buildings from around the world.

Content
(AR)CH+ is an online learning platform where Augmented Reality (AR) technology will be used. The 3D model of buildings will be coded into the system and by using a designated app, students can access the 3D by scanning AR Code, a type of QR code for Augmented Reality, through their devices such as smartphone or tablet. The 3D model contains the building’s history and highlights the architectural characteristic of the building. Students can hover around the building’s surroundings and walk through the interior and exploring the space. Each part of the building with distinctive architectural characteristics will be explained via text or audio, or both where students can choose the type of narrative. To make the learning process much more fun, AR gaming will be introduced in the platform. In AR environment, students from all over the world can collaborate in multi-player game mode where they will try to identify the characteristic of the building together and points will be given for each correct answer. Chat platform will also be introduced so that the students can have discussion among themselves. This gaming will allow students to form groups and compete with each other. Single player mode will also be available for the system.

Architecture is a field that takes concern on visual perception towards the space and the overall building. In order to further understand architecture, it is advisable to learn it in visual approach and experiencing it. 3D modelling can be the substitute to the real Built Environment experience. According to Daniel (2011), visual learning enhances learning since interactive effects are used to reinforce the content being learned. Effects like colors can be customized to assist an audience better understand the content of the subject. With this proposed E-Learning system that comes with Augmented Reality technology, student can experience the mimicked built environment by roaming inside and outside the 3D building in up-close manner. Radu (2014) has stated that there are four positive impacts of Augmented Reality experiences in education which are increased content understanding, long-term memory retention, improved physical task performance, improved collaboration and improved student motivation.

This E-Learning platform can be one of important platform in education, especially in learning architecture. The combination of AR Built Environment and AR Gaming in one system will make learning much more interactive and fun. Students from around the world can interact with each other through collaborative gaming and share their knowledge together. Wang et al. (2012) regard AR application as ‘effective environment for conducting collaborative inquiry learning activities’. Other authors join the observation of Improved Collaborative Learning as they mentioned ‘the opportunity for collaborative communication and problem-solving among students that arise from the augmented reality experience’ Kamarainen et al. (2013) and the ‘facilitation effects of AR technology on collaborative learning effectiveness’ Li et al. (2011).
There are some advantages of this AR application in this E-Learning platform. Through MOOC Web-based educational programme, it gives the opportunity for vast number of students to enroll the programme. With the introduction of AR application especially the AR gaming in the E-learning system, it will let more students to collaborate and learn together and creating bigger network of learning community. The interactive learning environment will increase students’ motivation to learn and they can understand the contents better.

(AR)CH+ is not only applicable for MOOC but can be adapted based on the learning environment. This E-Learning system can be used in physical classes where with the help of smartphones or tablet, students can play and learn together, and lecturer can facilitate and monitor the learning session. The AR application is not only limited for architecture but can be used for other field as well such as engineering where building or electrical component can be identified, medical students to learn on human anatomy and etcetera. This AR application can be commercialized for the education purposed and adapted based on different field.

Acknowledgement
The author would like to acknowledge and thank Professor Nurakmal Abdullah @ Goh Tuo Ho for the opportunity and encouragement for IUCEL2019 participation and Dr Atta Indrawani bin Zaini and all Faculty of Built Environment UNIMAS MOOC team member for advice and guidance.

References
SOLAH GUIDE DURING ILLNESS (SGDI) MOBILE APP

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Highlights: SGDI is an interactive mobile application aims to provide guide to user in performing solat during illness. Four(4) main condition of illness and two(2) method of ablution has been animated in 3D animation to show step by step how it can be done. Mobile platform chosen to ease user anytime and anywhere especially at the hospital. All multimedia elements are fully utilized to ensure the clear presentation of content to users.

Keywords: Solat Guide, Solat during illness, Solat guide mobile apps

Introduction
Solah is the second pillar of Islam. Solah Guide During Illness (SGdi) is a mobile application which has been developed to assist patients that has some difficulties to perform their solah in a normal way. SGdi application employs six learning modules. Four modules for solah and two modules for wudhu’ and tayammum. We included an animation as an awareness tools so more patients can perform solah in their way with the help of guardians.

Content
SGDI combines the learning theories and utilizing the multimedia elements to deliver the contents to the user. Performing solah is a must for a muslim in whatever condition unless he/she is unconscious. Report has been made that there are so many patients did not perform solah as research done at Hospital Sultanah Nur Zahirah. According to the researcher from Universiti Sultan Zainal Abidin, there are eighty percent of patients in Hospital Nur Zahirah Terengganu did not solah. The most reason of the patients cannot fulfil their prayers is because they do not know how to solah in a proper way (Abdullah, D. B., 2011). Even though there are many textbooks available that can be used to guide solah during illness, but it is not provided at ward and cannot be accessed easily. Therefore, this mobile app tends to help those who need the guide on how to perform solah not in normal way. However, this mobile app only visualize method of solah during illness according to Imam Syafie thought. Also, this mobile app only focuses on four common way of solah position plus two common way of ablution.

The application can be easily distributed through downloads and can be easily play at any android devices. It can be used by any level of users, either they are educators, learners, parents, guardians, patients or any individuals that can benefit from the contents. Teachers can use it to support in Islamic studies while hospital counselor can use it as an awareness tools so more patients can perform solah in their way with the help of guardians.

Acknowledgement
This project has been awarded Gold Medal in UniSZA Carnival of E-Learning 2019 (Unicel 2019) and the paper of Solah Guide During Illness (SGDI) Mobile Apps as Computer Assisted Learning (CAL) has been accepted to be presented at International Carnival of E-Learning 2019 (JCOEL 2019). We would like to thank all the members of Centre of Multimedia Studies, Faculty of Informatics and Computing for their commitments on this project.

References
ENHANCING ARTS TEACHING AND LEARNING THROUGH MOOC

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Highlights
This project is a collaborative effort by a group of Faculty of Applied and Creative Arts lecturers whom were involved in a MOOC project titled Application of ICT in Applied and Creative Arts. The objectives of this present project are twofold. First, it strives to identify problems rendered by using MOOC in the process of teaching and learning arts courses. Secondly, to enhance the use of MOOC by proposing solutions to the problems. Throughout the implementation of our MOOC project, it was found that while we were able to assess students’ understanding of the theoretical part of the project through quizzes, essays and polls, it was rather difficult to observe their overall process of completion such as drawing techniques, lighting set-ups for video production, reading notes and playing musical instruments, character design and other crucial elements that needs to be assessed.

Context of Innovation
It was also found that there is a high dropout rate in using MOOC, which is often associated with lack of engagement and low motivation among students to finish the course. This is due to the fact that the students are overwhelmed with information they need to grasp in order to understand the course’s content. By utilizing motion graphics, it helps the transfer of information with a compilation of important points in the form of text with icons. For instance, in teaching the setting up of three point lighting in film, icons could be used to represent “key, fill and back light” while showing how they are placed. By doing so, it helps learners in easily remembering both the function and placement of the light. Their motivation is the then increased to finish the course. In order to increase the motivation among students, there is a need to maintain high interactivity between the instructors and students as well as between the students themselves. Through MOOC, live feedback can be embedded therefore conversation between instructors and students can happen in real time. As such, students’ engagement with instructors can be conducted seamlessly. This however, is only ideal for classes with a small number of learners.

The Novelty
In light of this, to enhance the overall experience of teaching and learning in the Arts through MOOC, a comprehensive discussions between instructors was conducted. Using David Kolb’s theory of experiential learning as a reference, the result of the discussion was broken down into 3 categories; 1) Live content 2) Live feedback and 3) Live assessment. While live content was hypothesized to help students achieve concrete experience and abstract conceptualization, live feedback and assessment was expected to result in reflective observation as well as active experimentation.

The idea of online experiential learning is difficult to grasp. Some argue that it is impossible to embed online learning in real world example. This is somewhat true, especially in the context of Applied and Creative Arts. However, there are instances in which online learning platform such as MOOC can support experiential learning. For example, it is possible to use online multimedia resources (blended or flipped learning) to create reports and presentation of arts critique whereas for painting or performance technique may be delivered through combinations of tools such as web conference or live social media streaming.

Theoretically, the application of MOOC as proposed above can enhance teaching and learning experience of the students. Several variables play vital roles in ensuring success implementation of MOOC. Among them, the instructor’s roles in MOOC are providing good content presented in an engaging manner while assessing the practical based courses through live assessment. Students should also play their role by participating in MOOC. Enhancing teaching and learning activity using MOOC requires careful thought especially on synchronizing the learning outcome with the online learning activities.
VR SPEAKING BUDDY

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Highlights
Virtual Reality (VR) is the latest technology that is widely in various sectors such as education, entertainment and industry sales of good. Nowadays, the significant of learning new language becomes one of top priorities has been highlighted for those wish to surpass great achievement in most industries. Due to encourage Malaysian who mostly struggle whenever they need to speak foreign language, many associations join forces in changing these common phenomena. Thus, a virtual reality application named, VR Speaking Buddy is developed in order to help those who seek to familiarise themselves plus gaining their confidence when speaking another language. This application can provide a visualization solution to enhance the learning process and considered as a perfect practice tool for self-learning.

Keywords: Learning language, Fear of public speaking, Virtual reality technology

Introduction
Communication is a part of human life. It is a process for gaining understanding as well as making multiple bonding of relationships and experiencing life experiences as times goes by. However, those who use their native language, mostly would face difficulties when jumping into situations that require them to speak in foreign language with people who speak different language. Thankfully, technology has existed as important part of human civilization in making better progress for the future. Therefore, came the idealization of creating a virtual world which nowadays has been used for many kind of purposes in industries, especially for education. In order to make good use of this technology of virtual reality (later mentioned as VR), an application to develop a virtual world that helps people who lacks of confidence by being familiarise with situation whereas speaking with foreign language would be taking place.

Design of VR Speaking Buddy
The VR Speaking Buddy application was developed based on ADDIE model. This model consists of five phases which are (1) Analysis, (2) Design, (3) Development, (4) Implementation and (5) Evaluation. In order to create an effective learning, VR Speaking Buddy application comprised of learning modules. Learning module is conveying through the use of various suitable multimedia elements. This application using gaze input interaction technique. The advantage about this technique is user can interact using head movement with application. This VR application should be able to simulate the situation during speaking simulation in a group of three persons (including the user) while being accompanied by an examiner (also acts as instructor). The user will get to know how the flow of conversation goes and feel free to choose different situation that will brings them to a simulation room which a conversation would takes place.

Figure 1: Menu Interface shows details listed on tutorial panel and demo panel

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Context of VR Speaking Buddy
Most people face difficulties when need to use in foreign language at most unexpected moment. For some of them, speaking in foreign language is commonly hard to learn and they have been struggle to be good in it. This VR application obviously come with good intention as a helping hand that can help them to experience different kind of situation and observe the flow of conversation besides learning high level language learning for better speaking in public. Learners can get the feel of the real situation with their own two eyes better than studying in some self or payable tuition.

The VR application contains simulations that improve 80% learning process better than learning with books. Some contents in this virtual reality project let the students to experience foreign language pronunciations and grammar corrections in order to speak fluently for speaking experience. Surveys and researches had proven that implementation in virtual reality can improve learning process for leaners to feel and understand better about the concept in what they learn. What makes this VR application so unique is the friendly coaching that helps the students to explore what they had learned through books and implement in virtual reality contents. User can learn to speak in different languages such as English, Bahasa Melayu, and Arabic. Thus, this VR application itself is compiled and innovated with examples of conversation that present different situation occurs to make them be more familiarise with foreign language used as coaching method.

Advantages of Speaking Buddy VR
VR Speaking buddy interactive application can promote self-paced learning among the users and can help them for revision and many more since this interactive application promotes two-way communication among the users and the application. This application can help to overcome the fear of foreign language public speaking. While for the lectures/instructors, they can use this application during the class session as teaching aid so that easier for them as an assisting tool in providing understanding by having contents visualization. The target market for VR Speaking Buddy will be the students and teachers, Ministry of Higher Education Malaysia, and Foreign Language Institute.

Acknowledgement
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DIGITAL MAKERSPACE – AN INFORMAL LEARNING SPACE TO NURTURE INNOVATION

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Highlights: Digital makerspace is a way-forward to transform Malaysian youth from digital users to digital makers in the digital economy, which is also aligned with our nation headway in Industry 4.0. We understand that designing a learning space to accommodate a wide range of digital making activities is a challenging process. Thus, our aim to provide a service to establish a digital makerspace that is “flexible” in maximising a digital making environment for our clients. The flexibility is applied from space layout, learning module to gadget selection. It is also built based on targeted student group and risk assessment analysis.

Keywords: digital makerspace, hands on learning, co-working space, co-creation space

Introduction
Digital Makerspace is a physical makerspace to provide hands-on, creative ways to encourage students to design, experiment, build and invent as they deeply engage in science, engineering and tinkering. According to Nkoudou (2017), the maker movement is embodied in hacker ethics, DIY and free software ideologies; which involves a lot of exploring and tinkering. A makerspace (Brady et al. (2014)) is a co-creation space where people can share resource and knowledge, as well as allowing collaborations and teamwork. It is important that Digital Makerspaces are equipped with diverse tools, materials and learning resources that is made available for its members that could help nudge them to invent and embark on a digital making project. In order to establish a digital makerspace at school, it requires a series of procedure: requirement analysis, identify ideal space to transformed as Digital Makerspace, learning space layout design, procurement of suitable learning material and supplies, and finally the deployment of the equipment.

Digital makers are important to education for several reasons:

Digital innovations are disrupting all sectors and creating new job opportunities.
90% of all future jobs will require digital competencies
The digital economy is expected to contribute to 18.2% of the national Gross Domestic Product by the year 2020
The maker movement improves personal skills, enhance the interest in STEM activities.
We aim to help, support and transform our education into a system that nurtures students to have a mind of a digital maker and to become the socially informed and engaged future citizens that we want them to be. The impact of having a dedicated digital makerspace that we can look forward to includes creating confident digital users, and also a significant improvement on students’ interest in learning STEM subjects and participates in STEM activities.

Digital Makerspace Components

Table 1: Digital Makerspace Components

<table>
<thead>
<tr>
<th>Digital Makerspace Setup</th>
<th>Digital Design</th>
<th>Makerspace Learning Material and Supplies</th>
<th>Digital Makerspace Training Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Makerspace infrastructure</td>
<td>Floor Plan &amp; 3D layout design</td>
<td>Educational tools/gadget/equipment</td>
<td>3-days Digital Makerspace Train-the-Trainer training module</td>
</tr>
<tr>
<td>Physical Lab</td>
<td></td>
<td></td>
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<tr>
<td>Co-working space</td>
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</tbody>
</table>

Figure 1: The proposed layout for Physical Lab (UNIMAS, left) and Co-working space (for Woodlands International School, Sibu, right)

Acknowledgement
Faculty of Computer Science and Information Technology, UNIMAS.

References

STUDENTS’ LEARNING ENGAGEMENT THROUGH GAMIFIED KNOWLEDGE SHARING PLATFORM

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Highlights: The gamified learning platform was developed to allow students to share and learn from each other about the latest web technologies and languages. The conventional sharing platform normally doesn’t get good responses from students and not many are motivated to participate. A gamified module was developed to motivate students to participate and learn from other course-mates while competing among themselves to be the best among others using concept of badges, rewards and likes. The online platform incorporate some important core drives from Chou’s model (2015) and results showed significant increment in behavioural and cognitive engagement towards the gamified learning platform.

Keywords: knowledge sharing platform, gamified, gamification, programming sharing.

Abstract
One of the course learning outcome in the web programming course was to relate and explain some of the latest web technologies, web frameworks and languages. It is always a debate of the extend a lecturer can share all the knowledge to the students. The information about web technologies is updated all the time and unlimited. Getting the students to have self-initiative to learn and share online is an alternative of learning. A small scale research was conducted to design and develop a gamified online sharing platform to engage the students to study the related knowledge.

Student engagement is an important factor that could contribute to the desired and positive outcomes in university. Students nowadays feel bored with the school work. They feel disengaged, lack of involvement in the learning process and pay less effort to the given tasks (Daniels, 2018). Instructors spent countless time to figure out strategies to overcome this problem. Past studies concluded that there is a strong relationship between fun and engagement (da Rocha Seixas, Gomes, & de Melo Filho, 2016).

Gamification incorporate game element into non-game settings can resolve this issue in school (Lee, & Hammer, 2011). Institution mentioned that students able to learn better and care more about school when gamification is applied in school (Lee, & Hammer, 2011). Gamification can be observed through the three main parts, which are motivational affordance, psychological outcomes and behavioral outcomes (hamari, Koivisto, & Sarsa, 2014). Motivation affordances such as points, leaderboard, progress, achievement or badges and so on can provide positive effects to engage the students psychologically and react to the activities positively. Most past studies indicate the positive impacts and advantages of applying gamification in learning process.

Game elements and core drives of gamification are being applied during the implementation process of online sharing platform to induce student engagement in learning. The Chou’s 8 core drives (2015), namely accomplishment, empowerment of creativity and feedback, ownership, social influences, loss and avoidance were designed to incorporate into the online platform. The system was able to apply the gamification elements (Seaborn and Fels, 2014), for instance, points, badges, leaderboards, progression, rewards and so on. This platform will be a one-stop learning platform that gathered wide range of knowledge shared by students about certain important topics. The instructors can use the points and badges from the online platform to do their assessment while evaluating students’ content sharing in the platform.

About 100 students participated in the study. The results of study show that there is an increment in student’s behavioral and cognitive engagement when the gamified online sharing platform is being applied. Moreover, the core drive of gamification that shows statistically significant difference between the pre-test and post-test of the gamified elements: development and accomplishment, social influence and relatedness, empowerment of creativity and feedback, curiosity and unpredictability and ownership and possession. Hence, gamification indicates a positive result towards students’ engagement in learning process.

The online platform can potentially be commercialised through concept of subscription package. Each individual class or course might require different assessment features and gamified elements. Further discussion needed for different teaching needs and the online platform can be customised.
Acknowledgement
Special gratitude to Faculty of Cognitive Sciences and Human Development for encouraging staff in conducting research to enhance in teaching and learning.

References
JUNIOR ANTHROPOLOGIST: GAME BASED SMARTPHONE APP FOR SARAWAK CULTURAL VILLAGE

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Highlights: Junior Anthropologist is a game-based smartphone application, which acts as a mobile guide for children visitors at Sarawak Cultural Village (living museum). It enables children visitors to learn about various artefacts/point of interest while actively exploring the space. The app allows children to gain information from the physical environment through the digital game thus connecting off screen with on screen interaction. This app could enhance children visitors’ experiences by providing a learning component in a more innovative way during the museum visit.

Keywords: Public space learning, game based, smartphone app, children.

Product Description
The design and development of the smartphone apps involved the co-creation between children and researchers to ensure it involved the main stakeholders throughout the process. Prior research discovered that incorporating children in the design and development process of digital games have the ability to inspire creativity, innovation and critical thinking among children.

The Junior Anthropologist creates a meaningful experience that connects the physical and digital environment. The game design addressed the ability to sustain game play when children/players have to divide their attention to focus on both on-screen and off-screen elements simultaneously. Figure 1 shows the screenshot of the smartphone apps developed for children at SCV.
Context of the innovation
The motivation and rationale of the development of the game-based app for SCV because currently it did not provide activities for the accompanying children visitors that meet their needs or focus their tour and engage them with the displays at SCV. Although children seemed to be involved with the environment by moving from exhibits to exhibits, they were mostly having fun with no particular purpose. Children are obediently followed their parents instructions by pasing next to exhibits that caught their parents’ attention instead of their children interest whilst some just happily accompanied their parents from one exhibits to another. Some children were focused on their smartphone throughout the visit whilst other took picture of the sceneries, artefacts or exhibition. This echoes Templeton (2011) whereby though SCV has large amount of resources, children were detached with SCV owing to the lack of activities that can promote a meaningful museum experience that includes engagement, knowledge and learning, meaningful experience and emotional connection. Thus, the proposed smartphone apps will act as a mobile guide with the hopes of improving children museum experiences by addressing aforementioned issues.

Contribution to Education
Designing for children is not a trivial process. Petrelli, et al. (2013) highlighted that developing digital into physical is difficult, so it is essential to incorporate physical and digital materials to actively engage visitors and not to create parallel and detached digital experience. Previous studies have highlighted the benefits of using digital games for public space learning. For example McGonigal (2009) posited that games can be a good strategy for exhibitions to improve visitor knowledge and encourage powerful involvement with ideas displays and spaces as games are the dominant medium for engagement. On the other hand, Rowe, Lobene, Mott & Lester (2014) developed a 3D world to promote knowledge for museum learning for young generations. Smithsonian Institute have been actively developed various mobile technology for exhibition and recently introduced AR mobile guide for their visitors (Smithsonian Mobile, 2017). Munley (2012) described the importance of museums as a constructive settings for learning in museum. Nowadays, the museum visits become a family activity, the existence of informal learning space not only allows visitors to perform learning tasks but allows them to interact, discuss and exchange knowledge with each other’s ([Ibrahim & Fadzil, 2013]).

Commercial Values
The commercial value in terms of marketability or profitability of the framework of the game-based mobile guide application can be used to develop similar applications to engage young visitors at other cultural heritage sites or public spaces.

For the SCV, the annual visitors to SCV is approximately 140,000 (baseline data 2014). The monetary value is expected to be RM98,000 (RM 0.99 per download for 70% of the total visitors). A small advertisement in the app can also generate more money i.e other touristic venues or local businesses wanted to advertise their product. Money can be gained from cost per click when user install the app.

Acknowledgements
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References
CAEARA: CALORIES AWARENESS AND ESTIMATION AUGMENTED REALITY APPLICATION FOR LOCAL COMMUNITY

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Highlights: CAEARA application is an app that allow learner to explain the concept of calories for different food and it’s important to our health for balance diet. It’s also provide the formula for calories estimation for each meal. Learner can do a rough calculation on the calories intake for some local Malaysian food. The application was trained through machine learning algorithm to enhance its accuracy of local dishes recognition and provide rough estimation through databases collected.

Keywords: AR application, calories awareness, calories estimation, local dishes.

Introduction
The project applied augmented reality to the food field to stimulate the learners to visualize the concept of calories better and it’s important to a healthy balance diet. Augmented Reality (AR) technologies able to recognize the food and display the calories of the food in a glance. This is to increase the awareness on how much intake of calories that the person has eaten especially for the local dishes where local community might not aware of the high calories consumption for their daily intake and increase the obesity population in Malaysia. This AR application built with machine learning algorithm to train the app to recognize and estimate the rough calories intake for different local dishes in Malaysia (Figure 1).

Figure 1. Mobile AR application showing food calories information

The analysis of Food and Agriculture Organization of the United Nations (FOASTAT) shown that the dietary energy of the worldwide basis has been increased and the calories per capita is increased globally from the mis-1960s to the late 1990s in the developing countries (Bruinsma, 2002). According to Popkin et al. (2012), the trend of diet in 1970’s has begun with the processed foods that with more amount of oils and sugar food. The diets quality in United States is getting worse and cause the rate of obesity is rising across the United States and Europe (Popkin et al., 2012). According to United Nations Development Programme (2015), almost 30 percent of the world population has overweight problem and among 62 percent of the populations are from the developing countries. In addition, the percentage of overweight in children is predicted to double by 2030.

This is a very bad situation that the citizens do not aware on how much intake of calories that been eaten every moment. Besides, the purpose to conduct the study is to apply the artificial intelligence in calculating the calories by the Unity as this application yet been discovered in Malaysia. Thus, to educate the society, a food recognition and calories calculating modules are needed. In addition, as almost everyone has smart phone and is powerful enough to run such system, so the modules above will be tested in Mobile Augmented Reality prototype.
Throughout this research, user can manage their eating habit to become healthier instead of eating high calories food that could cause heath disease. With this application, citizens can always be aware on the calories intake for every meal. Besides, users can easily determine the calories of the food as the application will show out the calories and name of the food. Besides, the Google AI library in Unity can be discovered in detail to develop the mobile augmented reality application.

There are few researches from past study that carry out in the food industry. A related field that estimate the food calories based on the food actual size (Tanno et al, 2018). The study has been come to a new approach which estimate the food calorie with CNN and Augmented Reality (AR) based on the actual size of food estimated (Tanno et al, 2018). To assist citizen on take care on their eating habits, this model has implemented to record the meals based on the actual size of the food that been intake every day. Deep learning is used for the memory capacity and image processing of the device. Thus, the Inception-v3 and fine-tune pre-trained ImageNet model in Keras Deep Learning framework with were used to process the memory, making inferencing, and classification (Tanno et al, 2018). These models have been used because it has a highly accuracy in recognition, fast in making inference, and light in memory (Tanno et al, 2018).

Another study has implemented by Kawano and Yanai (2014) which used Fisher Vector and liner one-vers rest SVMs to recognize food that unable user to record the food habits. The name, calories, and nutrition of the food will be shown on screen and recorded to the Web by sending the records to the server. The experiment has used 100 types of food categories to test the system and the classification has reached 79.2% (Kawano & Yanai, 2014). There are three steps in this food recognition system: (1) an interactive and real-time food recognition and recording system running on consumer smartphone, (2) using Fisher Vector on a mobile device, and (3) automatic adjustment of the given bounding box (Kawano & Yanai, 2014). The Fisher Vector encoded HOG patch and Color patch. Histogram of Oriented Gradients (HOG) is used because the description is simple and process faster than the SIFT and SURF and it can extract feature more densely which assist the recognition accuracy (Kawano & Yanai, 2014). The classifier that used is linear kernel SVM which can be executed offline. With the combination of both, the parameter vales that used in recognition can be stored in the main memory of Fisher Vector (Kawano & Yanai, 2014). A study has conducted by Waltner et al. (2015) which assist an individual to making food shopping decision on the dietary management by a mobile augmented reality technology. By using the Random Forest classification and multiple color feature spaces, the nutrition information will be shown in the system according to the individual. The concept of the functional eating diet which is also known as a modern diet is used to give advice on which fruits and vegetables to buy to buy to improve the user’s health. Another study from Weiyu et al. (2015) has did the research of food recognition and nutrition estimation with dense HOG, dense SIFT, and SVM classifier. This mobile food recognition system is implemented successfully which it can recognize the food that presented by snapping the picture of the food and estimate the calorie and nutrition content. In addition, the system is implemented as an Android smartphone application which achieved over 85% accuracy when detecting 15 categories of food.

This AR application has it potential to commercialise to food authorities, restaurant that promote healthy diet and the public through Apple Store or Google Play Store.

Acknowledgement
We are grateful to Faculty of Cognitive Sciences and Human Development for encouraging staff in conducting research to innovate in teaching and learning ideas to students and community.

References
ACTIVE EXPERIENCE SHARING IN INTERNSHIP THROUGH PEERAGOGY

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Highlights: Internship program designed to allow students to gain real-life working experience. It would be more benefits to Cognitive Science students to know what are the fields and job opportunities of the peers is exposing to. The web-based system creates a peer supporting community for the students to share students’ tasks in internship while motivating the students to continue their internship. Some students who have had good experience or facing issues in internship, this is a channel for them to express themselves and having peers supports. The participation in the system showed students with issues can be rectified and gained more satisfaction throughout internship.

Keywords: Internship community, peer supports and learning, active experience sharing.

Introduction
Internship program designed to allow students to gain real-life working experience and prepare the students to the real job market when they graduated. Each student provides a chance to select their internship field and organisation to involve with. However, it would be more benefits to the students to know what are the fields and job opportunities of the peers is exposing to. Normally students only focused on their own internship without knowledge of what others are doing. It would be especially useful for Cognitive Science students to have an overall view of the job opportunities as not to limit themselves to only the subjects they studied throughout three years, but also the practical skills needed in the market. In addition, the experience shared in the system would be a guide for the juniors who would like to apply for the same internship places in the coming years. The existing practices doesn’t retain students feedback and tasks allocation for Cognitive Science juniors. The information only kept for students’ assessments.

Experiential learning is effective to help students to develop meta-cognitive abilities and adapt to the real world situation in order to initiate self-directed learning (Kolb and Kolb, 2006). Petko, Egger and Cantieni (2017) in their study examined the impact of online blog for teachers in education program to write their daily log and reflection, in term of stress level, self-efficacy and reflective abilities. 176 teachers participated in the study. The online blogs were focused on daily log concepts in emotion and problems during 4-week teaching practices. Data showed students that written more on problems developed a stronger self-efficacy during their internship program as compared to other groups. The results showed also peers feedback give a strong impact to the self-efficacy as well. The web-based system creates a peer supporting community for the students to share their tasks in internship while motivating the students to continue their internship. Some students who have had good experience or facing issues in internship, this is a channel for them to express themselves and having peers supports. Internship coordinator can monitor and provide feedback to continue supporting the students. The system can provide an overview to the lecturers in the program as well to how the real training scenarios at intern place.

The study was conducted at the later stage of the internship for students. There were about 100 students take parts in sharing their internship roles, reflections and issues the system. Some are actively sharing their reflection of what they have learnt in the organisation, while certain students expressed their challenges faced during internship. Peers feedback and supports provided a strong ground of their performance. It would more useful to provide this web-based experience sharing system at the earlier of the internship to allow more peer learning and supporting process. The system is potentially being promoted to colleges and universities in Malaysia as well as other countries. It could be customised to accommodate assessment process. The packages can be sell based on subscription basis.

Acknowledgement
Special gratitude to Faculty of Cognitive Sciences and Human Development for encouraging staff in conducting research to enhance in teaching and learning.

References
INSTAGRAM: INCREASING LEARNING ENGAGEMENT AND INTERACTIVITY THROUGH BITE-SIZED LEARNING ‘GEM’

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Highlights: This abstract covers the innovative method of using Instagram as the bite-sized learning platform as a blended learning initiative in cybergogy paradigm for TMF2034: Database Concept and Design course in UNIMAS. By using Instagram, it is possible to cover all three domains of cybergogy and to address the problem of students’ short attention span. The impact shows the effectiveness of this method in order to supplement traditional classroom sessions, fosters instructor’s creativity when creating bite-sized contents and the possibility of having sustainable knowledge transfer.

Keywords: cybergogy, bite-sized learning, Instagram

Introduction
In order to promote active engagement in class, instructors have to be creative when conducting teaching and learning activities. According to Bunce et al. (2010), students consistently reported fewer lapses of attention when teachers were using “non lectures pedagogies,” such as demonstrations, group work and clicker questions. To vary instructional approaches in this digital era is a need, especially to ensure the increase in understanding of conceptual knowledge before start diving into technical aspects of the course. Wang et al. (2006) published a model called Cybergogy for Engaged Learning that covers three overlapping domains: cognitive, emotive and social for learner engagement online. This model inspires the innovative method explained in this abstract which covers all three domains, including the problem of students’ short attention span during lectures.

Learning Content Design and Process
A suitable platform to cover the domains of cybergogy and to cater short attention spans was searched while planning the contents for TMF2034 Database Concept and Design, and these are the minimum criteria needed:

- Free platform
- Short videos for content – bite-sized, less than 1 minute per “bite”, available on demand
- High options for interactivity (notifications, direct replies, different types of social interactions for students’ engagement)
- Ability to see feedbacks (view counts, response to social interactions, private conversation for the 1-to-1 consultation)
- Majority of the students are already on the platform (avoiding new sign ups & installations)

One platform fits all five criteria and it is one of the most popular social media platforms used by influencers and businesses, Instagram. Instagram is free, limits videos to 1 min for posts, 15 seconds for insta-stories, and provides for longer than 1-minute videos, called IGTV. There are many social interaction ‘stickers’ that can be used for interactivity, which includes polls, quiz, short answers question stickers and many gifs to animate the images/videos uploaded.

In this course, Instagram was used as supplementary off-lecture session, and highest traffic occurred during active lesson sessions and study week before the finals. Majority of the contents were designed using the insta-stories, categorized using Highlights feature, and the stories are organized by sequence which resembles step-by-step instructions. 95% of students enrolled in TMF2034 are already on Instagram, and all insta-stories shows viewers numbers and enable replies directly to each story.

Background of the Course
TMF2034: Database Concept and Design is a course that requires strong conceptual knowledge and technical knowledge. Understanding conceptual knowledge could be hard in a classroom setting and publishing compact notes on database concepts in Instagram has improved their understanding and elevates the motivation to attempt the technical parts of the course.

Importance to Education
Instagram will still be relevant in the near future due to its flexibility for social influencers and businesses. It is expected more features will be added to it and it is time to start utilizing the platform for education. It is in line with this year’s
IUCEL theme and the government’s aspiration to use learning tools with computer and technology, Instagram has so much to offer and it is free, mobile, and provides on demand videos which can be accessed anywhere anytime.

Advantages of the Innovation
The impact of this innovation can be classified in three categories:

Improved students’ engagement
The original idea was the TMF2034’s Instagram will only be used for the group that is taught for the semester (60 students out of 270 students), but the enrollments poured in; students from other groups started to catch up on the videos and engaging in the insta-stories posted in TMF2034’s account.

Improved retention of memory / flow-of-work
Random observation was done during the marking of exam papers, where most of the answers showed the flow-of-work covered in the Instagram account.

Increased interactions with instructor compared during lectures
During lesson sessions (when instructors actively posting insta-stories), the interactions between students and instructor are 80% more active than during lecture sessions. It is believed that the interactions come from the silent ones in class and they were more comfortable interacting through Instagram and were motivated to try answering all questions posted by instructor.

Creativity in creating contents
Using Instagram helps instructors to be creative in designing compact contents such as short videos and compact notes to ensure the knowledge disseminated are understood by students.

Sustainability of knowledge transfer
This innovation is practical to the students and public especially those with existing Instagram accounts. There were other students from other universities engaging in TMF2034’s Instagram during active lesson session due to their final examination on the course was held on the same week as ours.

Commercial value
Intellectual Property: The videos can be enhanced in order to be registered for intellectual property. Some of the compact notes are tips and tricks originally created by the instructor, which is planned to be published as a handbook.

Acknowledgement
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References
MY SHAKHSIYYAH AR

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Highlights: My Shakhsiyyah AR merujuk kepada 'sahsiahku yang dipersembahkan menerusi teknologi augmented reality (AR)’ atau realiti maya. Shakhsiyyah bermaksud sifat-sifat yang membezakan seseorang dengan yang lain. Ia juga merujuk kepada akhlak yang berasal dari bahasa Arab iaitu khuluq. Khuluq merupakan keadaan jiwa yang kukuh, keluar daripadanya perbuatan-perbuatan sama ada baik atau buruk tanpa seseorang itu perlu memikirkannya terlebih dahulu sebelum melakukan sesuatu perkara. Ia juga merujuk kepada al-khilqah iaitu fitrah (sifat semulajadi), tabiat, agama atau ringkasnya ialah gambaran batin seseorang. Untuk menjelaskan perkara ini, teknologi AR dimanfaatkan penggunaannya agar ia dapat menarik perhatian pengguna untuk memahami sesuatu topik pembelajaran. Ia juga melibatkan penggunaan Apps yang merupakan aplikasi yang merujuk kepada program yang beroperasi dalam peranti mudah alih, seperti telefon pintar.

Keywords: Shakhsiyyah, akhlak, aplikasi telefon pintar, augmented reality

Objektif
1) Menjelaskan konsep shakhsiyyah atau akhlak Islam menerusi teknologi augmented reality (AR).
2) Menyediakan ayat al-Quran, asbab nuzul, pembelajaran menerusi permainan game dan sebagainya berkaitan topik akhlak.

Keaslian & Kreativiti
1) Belum ada aplikasi AR ini digunakan secara meluas dalam pembelajaran akhlak Islam.
2) Aplikasi ini direkacipta berdasarkan perbincangan dengan para pensyarah.

Kegunaan dan Aplikasi
1) Mesra pengguna
2) Akses kepada video dan audio berkenaan akhlak Islam.
3) Pembelajaran menerusi contoh permainan game tentang akhlak.

Potensi Komersil / Kebolehpasaran
1) Maahad Tahfiz Darul Wafa’ Shah Alam
2) QUDWAH LEGACY Training & Consultant
3) MEDIA PROS PRODUCTION RESOURCES
4) Hayrat Foundation (Turki)
5) 400 pelajar subjek USD10302 : Al-Akhlq Wa Al-Tasawwuf
6) 250 pelajar subjek US120603 : Haqaiq Al-Tasawwuf

Mesra Alam (Environmental Friendliness)
1) Aplikasi ini mudah dan selamat digunakan
2) Boleh digunakan di mana-mana tempat
Impak Sosial (Social Impact) 1) Memberi kefahaman kepada subjek dan topik pendidikan akhlak di sekolah dan universiti. 2) Membantu sesiapa sahaja yang boleh akses menerusi telefon pintar untuk memahami akhlak islam.

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References

ANIMAL PHYSIOLOGY MOOC

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Highlights: Animal Physiology is one of the pioneering niche courses designed for open learning in Malaysia. It is the
only course focusing on the physiological system with reference to animal models (non-human) across all of the major
Massive Open Online Course (MOOC) platforms. The course has attracted on average 150 students annually with
participants from over 12 countries in the current sessions alone. An OpenCourseWare version of the course is also
available, providing distant learner various forms of media contents.

Keywords: animal physiology, distance learning, massive open online course, open learning, online learning.

Introduction
With the benefits of global accessibility and the existence of numerous e-learning tools, open and online learning is
becoming increasingly popular in today’s generation. Animal Physiology is one of the pioneering niche course
designed for open and online learning in Malaysia. The course was first introduced as an open online course
(OpenCourseWare, Universiti Malaysia Sarawak - Animal Physiology) in 2014 (1) which provide distant learners from
various background access to original lecture contents for free. The Animal Physiology has been awarded as the best
OpenCourseWare in the National University Carnival on e-Learning in 2014. Subsequently, the Massive Open Online
Course for this subject was developed under the niche courses category and has been available online since
September 2015 via the OpenLearning platform (2,3). Since its inception, the course has attracted an average of
more than 150 students annually with the current session receiving participation from countries including Brazil, Italy,
Canada, United Kingdom, Philippines, United States, Germany, Australia, Croatia, India, Indonesia and Bosnia and
Herzegovina. To date, this is the only course available across major MOOC platforms (e.g. edX, Coursera, Udemy,
FutureLearn) that focuses on the fundamental of the physiological system concerning non-human animal models. The
Animal Physiology MOOC aimed to provide quality learning content for distance learner seeking to understand the
basic concept of the animal¹ forms and functions.

Content
The Animal Physiology MOOC covers fundamental knowledge on how animals adapt physiologically to
environmental challenges and compare the connection between forms and functions in various animal taxa. Principle
mechanisms that underlie physiological processes are covered in eleven learning units which are divided into 47 video
series totaling over 230 minutes of online lecture. The learning units consisted of an Introduction to Animal Physiology
followed by ten selected physiological systems which include digestion, excretion, osmoregulation, thermoregulation,
reproduction, respiration, circulation, endocrine, nervous, and muscular. Each of the learning units consists of three
parts which are Learning Materials (video lectures), DigDeeper (additional resources) and Quiz or activity (self-
assessment). Students are allowed to enroll in the course at any time with approximately 14 weeks’ duration to
complete the course. Successful completion of the course enables students to 1) distinguish the general physiology of
animals; 2) explain the physiological problems faced by animals, how those problems vary in relation to the animals’
environments, and the processes by which animals solve their problems; 3) measure the physiological processes and
relates to anatomical structure; and 5) integrate critical thinking and scientific knowledge about issues in animal
physiology and organize them in an effective manner. With distance learning via open and online platforms are
streamlined to develop such quality and free access learning content to distance learner of all backgrounds. This course
has successfully become one of the first niche courses offered in the open learning arena of Malaysian education.

Acknowledgement
We are grateful for the Centre for Applied Learning and Multimedia, University Malaysia Sarawak for their continuous
support and assistance in developing the Animal Physiology MOOC.

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DeTAR Putra, Universiti Malaysia Sarawak
CULTIVATING AND STRENGTHENING BLENDED LEARNING THROUGH AN INNOVATIVE LEARNING MANAGEMENT SYSTEM

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Highlights: Blended Learning (BL) is not a new word for all academicians in Malaysia since 2011. In Dasar e-Pembelajaran Negara (DePAN), blended learning implementation status is one of the key indicators for the online pedagogy domain. Ministry Education of Malaysia together with Malaysia Centre of e-Learning (MyCEL) and The Council of the Malaysian Public HEIs e-Learning Coordinators (MEIPTA) requested all IPTAs in Malaysia to report their BL implementation status as its key performance index (KPI). Some universities have some problems in term of monitoring their BL implementation and report it to MEIPTA. In UTeM, we have developed an automatic BL monitoring embedded in our current learning management system (LMS) which is called ULearn. Academician in UTeM can identify their course BL implementation status in a blink of an eye through UTeM’s innovative LMS.

Keywords: Blended Learning, Innovative Learning Management System (LMS), DePAN.

Introduction
Learning Management System (LMS) has become a powerful tool for universities to deliver and provide the best e-Learning environment. Most of all Higher Education Institutions (HEIs) in Malaysia already do have their own LMS for their e-learning environment. In UTeM, the LMS is called ULearn which is based on the Moodle platform. Through ULearn, the instructors/lecturers can upload various kinds of their learning materials and activities for their students. The students in the other hand can easily access ULearn and communicate both synchronously and asynchronously with the instructors/lecturers. Based on the mechanism introduced by the MeiPTA, the status of blended learning implementation in a course offered in LMS can be measured. The introduction of technology in education is the cornerstone of innovation in teaching methods and pedagogy. Hence, the introduction of blended learning which is the combination of face to face (F2F) and online learning (non F2F) is being increasingly accepted and explored as an effective method for teaching and learning. According to the operational definition (OD) by the Ministry of Higher Education Malaysia in e-Learning guidelines for Malaysian HEI (2014), blended learning (BL) refers to a course that has a mixture of online learning mode (non F2F) and onsite learning mode (face to face - F2F) with the 30% - 60% of the course content and activities are conducted online.

Blended Learning Measurement defined by MEIPTA
In Malaysia, under the Ministry of Education has launched our national eLearning policy or famously known as DePAN in 2011. DePAN stated the framework and moving forward action of e-Learning at HEI’s in Malaysia in every 5 years. Now, the latest policy is known as DePAN 2.0. In this latest policy, the online pedagogy has been accepted as one of the domains that need to be looked at as shown in Table 1.

Table 1: Timeframe and target for Online Pedagogy in DePAN 2.0

<table>
<thead>
<tr>
<th>Domain</th>
<th>Focus Area</th>
<th>Phase 1 2015</th>
<th>Phase 2 2016-2020</th>
<th>Phase 3 2021-2025</th>
</tr>
</thead>
</table>

DeTAR Putra, Universiti Malaysia Sarawak
The Council of the Malaysian Public HEIs e-Learning Coordinators (MEIPTA) which has been established since 2007 plays a key role in assiting Ministry of Education in ensuring the success of e-Learning agenda. In order to standardized and provide a mechanism to measure the blended learning implementation in each HEI, MEIPTA has agreed to a mutual understanding. In order to achieve the minimum 30% of blended learning activities, the instructor/lecturer needs to upload ONE (1) course outline, a minimum of SEVEN (7) resources, conduct a minimum of THREE (3) activities and create a minimum of TWO (2) online assessments in their respective LMS. The resources can be in the form of files, pages URLs, e-books, and video lectures. While the activities can be in the form of chats, forum discussions and surveys. For the assessments, it can be in the form of online quizzes and assignments. This type of measurement of BL have been recognized and accepted by all the twenty (20) IPTAs in Malaysia.

**Innovative ULearn as UTeM’s Learning Management System (LMS)**

![Figure 1: ULearn as UTeM’s Learning Management System (LMS)](image)

Figure 1 above shown the basic interface of the LMS in UTeM that support the single sign-on facilities. The lecturers/instructors need to use the same username and password to access ULearn. On top of this, ULearn also has the innovative way to notify the lecturers/instructors regarding to their BL status achievement for that semester. The lecturers/instructor themselves can monitor their BL status through the reactive pop-up windows embedded in their respective course page. They will have the quick overview of items that they need to do in order to achieve the BL status for their course. This innovative LMS also lessen the burden of the faculties e-Learning committee tasks. Now, they can also view the overall BL achievement of their faculty in a split of time. PSTP in the other hands will reduce lots of time taken in term of reporting to MyCeL and MEIPTA regarding to BL implementation status in UTeM. The motivation to ease the troublesome of normal procedure to identify the status of blended learning is supported by Childs et al. (2003). They have proposed it 14 years ago that in order to successful delivery of e-Learning, an easy and regular access to technology for both lecturers/instructors/facilitators and students is a prerequisite factor that need to highlight. As the conclusion, other higher learning institutions are welcome to use UTeM’s simple yet effective approach in cultivating the blended learning awareness to the academician and successfully implemented it in their own institution.

**Acknowledgement**

The authors would like to take this opportunity to acknowledge the guidance, help and support provided by the management of Universiti Teknikal Malaysia Melaka (UTeM) towards the development and implementation of e-learning in UTeM since 2013. The authors also wish to express their appreciation to all MEIPTA members and staff from the Centre for Instructional Resources & Technology (PSTP), UTeM for their full support and cooperation.

**References**


IMPLEMENTATION OF CREDIT TRANSFER MOOC (CTM) RECOGNITION IN UTEM

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Highlights: We have developed the credit transfer MOOC’s procedure to enable the learning through MOOC platform can be recognised in the University. This effort is a consequences task after the Malaysian Qualifications Agency (MQA) launched the Credit Transfer for MOOC (CTM) guideline to support the Globalised Online Learning (GOL). Basically, the guideline is launched as a reference for the Higher Learning Institution (HEI) to recognise the MOOC as an avenue for acquisition of learning, to provide recognition through the award of credits and to reduce duplication of learning among the learners. A lot of processes involved in order to make the objective of credit transfer MOOC (CTM) became a reality in UTeM. We have gone through all the processes until the CTM’s approval is granted from UTeM Senate - the highest academic board in university and became the first IPTA in Malaysia that implement CTM in its academic curriculum.

Keywords: Credit Transfer MOOC (CTM), Massive Open Online Course (MOOC)

Introduction
Massive Open Online Course (MOOC) have emerged and modified the education landscape particularly in the context of higher education in Malaysia. Since year 2013, each of Public Higher Education Institution (PHEI) in Malaysia starts to develop the content for MOOC. The MOOC initiative in Malaysia is prominently highlighted in the Malaysian Education Blueprint 2015-2025 (MEB) [Higher Education] in Shift 9 - Globalised Online Learning (GOL). GOL is aimed at enhancing the quality of course-delivery, lowering the cost of delivery, bringing Malaysian expertise to the world, enhancing the branding and visibility of Malaysian HEIs as well as fostering life-long learning among Malaysians. It is the spirit of Credit Transfer for MOOC (CTM) to support the Globalised Online Learning (GOL) initiative as highlighted in Shift 9. In UTeM, several groundwork, workshops and discussions regarding to the CTM implementation have been done. After several meetings and presentations to top management, UTeM now can be proud as being the first IPTA in Malaysia that recognized MOOC for credit transfer for undergraduate programme. As a starting point, UTeM only recognized Mandarin course taking through UTeM MOOC. We are hoping that this path is the pioneer path towards more other courses that can be recognized in the future. This step is a crucial to enable recognition of MOOC as another way for acquisition of learning, equally recognition for a credit in higher learning and to reduce the duplication of learning.

Globalised Online learning
Based from Malaysia Education Blueprint 2015 - 2025 (Higher Education) (2015), the Internet penetration in Malaysia currently stands at 67% which is the seventh highest penetration rate across Asia. This puts Malaysia in a good position to harness the power of online learning to widen access the knowledge without boundaries. Malaysian academician and students can have a flexible time to a good quality content that can enhanced the quality of their teaching and learning activities. They also can share their knowledges and expertise in order make themselves visible to the global community. Malaysia needs to move from a mass production delivery model to a new one where technology-enabled innovations are harnessed to democratise access to education and offer more personalised learning experiences to all students. The increase in student participation and recognition shows that MOOCs are a huge
success in the betterment of quality and accessibility for our higher education, both locally and internationally. This also aligns with the Malaysia Education Blueprint 2015-2025 (Higher Education), particularly in Shift 9 - Globalised Online Learning as shown in Figure 1, which aims to shape education through online resources and tools.

![Figure 1: Ten Shift in Malaysian Education Blueprint 2015-2025 (Higher Education) and the shift 9 – GOL in red box.](image)

The objective of GOL is clearly stated in the MEB 2015-2025 (Higher Education) which is enhancing the quality of course-delivery, to lowering the cost of delivery, to bringing Malaysian expertise to the world, enhancing the branding and visibility of Malaysian HEIs and fostering lifelong learning among Malaysians.

**MOOC in UTeM and CTM**

The efforts to develop the quality content of three MOOCs in UTeM started in 2014 after the launched of four pilot MOOCs by UPM (TITAS), UKM (Hubungan Etnik), UNIMAS (ICT Competency) and UiTM (Introduction to Entrepreneurship). Habibah et al. [2016] reported that those four pilot MOOCs are getting a good response from the students in HEIs in Malaysia with the mean of 3.92 from 5 (Strongly Disagree (SD)-1, Disagree (D)-2, Neither Disagree Nor Agree (NDNA)-3, Agree (A)-4 and Strongly Agree (SA)-5) in terms of learning design from student perspective. In 2015, UTeM successfully launched its three MOOCs (Mandarin Language 1, Introduction to Database, Critical and Creative Thinking). Table 1 shows the KPI set by the Ministry as in the DePAN 2.0 document.

Table 1: Timeframe and target for Online Pedagogy in DePAN 2.0

<table>
<thead>
<tr>
<th>Domain</th>
<th>Focus Area</th>
<th>Phase 1 2015</th>
<th>Phase 2 2016-2020</th>
<th>Phase 3 2021-2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Pedagogy</td>
<td>Open Course</td>
<td>Each HLI’s offered at least 3 open courses (MOOC)</td>
<td>Each HLI’s offered at least 15 open courses (MOOC)</td>
<td>Each HLI’s offered at least 30 open courses (MOOC)</td>
</tr>
</tbody>
</table>

In UTeM, the development and planning of MOOC courses in under the purview of Pusat Sumber dan Teknologi Pengajaran (PSTP). A moving forward of the MOOC courses offered by UTeM is the recognition of credit transfer MOOC (CTM) after the launch of the CTM guideline by MQA. Several paperwork’s and workshops have been done in order to seek an approval from the University Senate. UTeM is successfully implemented CTM for Mandarin Language 1 in semester 1 2018/2019 and received a congratulation letter from Malaysian Qualification Agency (MQA) for successfully developed the procedure of Credit Transfer MOOC (CTM) and implemented it in UTeM. This achievement encourages flexible learning among students, reduce the duplication of learning and recognise the lessons and experiences gained outside the conventional classroom. At the same time, it will reach the goal of globalised online learning that is stated in the Malaysia Education Blueprint 2015 - 2025 (Higher Education). In conclusion, other HEIs also can learnt the success stories from UTeM and hopefully can also implemented a CTM MOOC recognition in their university, academic curriculum.

**Acknowledgement**

The authors would like to take this opportunity to acknowledge the guidance, help and support provided by the management of Universiti Teknikal Malaysia Melaka (UTeM) towards the development and implementation of e-learning in UTeM since 2013. The authors also wish to express their appreciation to all MEIPTA members and staff from the Centre for Instructional Resources & Technology (PSTP), UTeM for their full support and cooperation.
References
DIGITAL GAME-BASED LEARNING ENVIRONMENT: CONNECTING EXPERIENCES AND CONTEXT

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Highlights:
Educators are finding it increasingly challenging to engage and motivate students with traditional modes of teaching. One tool that may help them in this endeavor is game-based learning, which is beginning to spark the interest among educators in higher education. Game-based learning allows students to engage with educational materials in a playful and dynamic way. In addition, digital games are commonly perceived as a form of entertainment, which have been proposed as one of the effective tools if they were combined with education to promote active learning and motivation among students. Numerous application of digital game-based will be presented to engage different learning style and students’ background. The effectiveness and the ability of game-based learning environment to enhance students’ understanding as well as students’ motivation and soft skills is further discuss in this paper.

Keywords: active learning, instructional game, learning technologies

Introduction
Application of game-based learning in Malaysian higher education is increasingly getting favorable perception among educators (Noraddin, 2015). Educational games are beneficial to reinforce learning, offering immediate feedback and recurring gratification. Games were proven to be deeply engaging, visually dynamic, rapidly paced, and highly gratifying pictorial experiences that make almost it favourable than any sort of conventional education (Foreman, 2003). Felicia (2010) suggested that game-based activity are effective in motivating, engaging students, with active support from teachers in the introduction and running of the game. Liu et al. (2013) stated that students expressed that learning with the game-based learning could assist them to gain and increased their interest in acquiring scientific knowledge. With the help of game-play, the players are motivated to participate in the games and complete their tasks.

Lack of communication skills, higher order thinking skills, low ability to work in a team and self-efficacy are among problems that arise among Malaysian young graduates. Minimal interest and attention towards knowledge seeking will create boredom and stress that hinder the transfer of knowledge among the students. Hence, several new strategies have been proposed, including learning through digital games. The integration of digital games in learning environment is beneficial to promote student engagement and joyful learning process (Prensky, 2003).

Content:
Among of the benefits of digital game-based learning, it provides an opportunity for students to involve in active learning, an instructional activity involving students in doing things and thinking about what they are doing (Bonwell & Eison, 1991). This includes problem-solving exercises, informal small groups, simulations, case studies, role-playing, and other activities that focus not only on developing students’ knowledge but also their skills and abilities (Meyers & Jones, 1993). The most important instructional element of active learning is to involve and engage the students with the teaching and learning activities in the classroom (Prince, 2004; Chan et al., 2015). According to Malaysia Education Blueprint (2015-2025), Ministry of Higher Education have emphasized Globalized Online Learning under Shift 9 as an effort to encourage educators to promote class engagement via blended learning. Therefore, online-game based activity is one of the strategies in meeting this requirement.

There are different types of game-based learning contents that can increase the effectiveness of implementing relevant learning models into problem solving. Griffin (2014) suggested learner’s background influenced learner’s motivation to learn and thus affected their performance. Therefore, the educator should vary their game-based learning activities during teaching and learning activities.

Acknowledgement
Special thanks to Faculty of Resource Science and Technology (FRST) and Centre for Applied Learning and Multimedia (CALM), UNIMAS for their support throughout blended learning course development.
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Felicia, P. (2010). What evidence is there that digital games can contribute to increasing students’ motivation to learn? Brussels, Belgium: EUN Partnership ASBL.
ON BECOMING A PROFESSIONAL HELPER THROUGH MOOCS: INITIATIVES FROM COUNSELLOR EDUCATORS

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Highlights:
Counselling program in UNIMAS received highly demand from non-counselling students to enroll in our elective courses. In 2016, a group of counsellor educators develop Helping Relationships Massive Open Online Course (MOOCs) through Open Learning platform. This Helping Relationships course provide an innovative platform for teaching and learning strategies and could reach massive number of students. This course not only embed the knowledge element of helping but able to create awareness for learners to help others.

Keywords: helping relationships, professional helper, helping theories, basic helping skills.

Introduction
MOOCs for Helping Relationships is a collaborative effort developed by counsellor educators from Counselling Program, Universiti Malaysia Sarawak (UNIMAS) to reach non-counselling students and online communities. Since 2013, counselling program has initiated traditional face to face Basic Helping Skills course as an elective course and only can offer up to 40 students per class. This traditional face to face counselling course attracts attention number of UNIMAS students. In 2015 we are requested to develop a course that can offers to a large number of elective students. We developed Helping Relationship course and received high demands from non-counselling students to enroll in this course. In 2016, our group developed MOOCs Helping Relationship course through Open Learning platform. We are the first MOOCs offered from our faculty, Faculty of Cognitive Sciences and Human Development, UNIMAS. We received Sijil Anugerah Khas Majlis Anugerah Gemilang UNIMAS (MAGU) in 2017 for this MOOCs for Helping Relationship. Currently, 469 students have enrolled in this course at https://www.openlearning.com/courses/helping-relationships/ which contain seven sub-unit. The unit are; Unit 1: Principles of Professional Helping Relationship, Unit 2: Helping Theories, Unit 3: Model and Stages in Helping Relationship, Unit 4: Effective Communications in Helping Relationship, Unit 5: Basic Helping Skills, Unit 6: Helping Strategies and Unit 7: Related issues in Helping. Upon completion this course, the students will obtain a certification from Open Learning. This MOOCs for Helping Relationships gave the opportunities for the online learners to venture a learning experience on becoming a helper.

Description of innovation.
Basically, MOOCS Helping Relationship is develop from Helping Relationship traditional face to face course. This course introduces the students to the principles of professional helping relationship, the roles of professional helper, helping theories, models and process, effective communication, basic helping skills, helping strategies, and related issues in helping. Most of the students who enroll in this course are from various background such as cognitive sciences, human resources development, social science, arts and creative, engineering, resources sciences, computer sciences, medical and economy and business. This course is able to give an added value to the students to embed human factors in their profession.

What is the context or background of the innovation?
In 2016, each faculty in UNIMAS is required to develop their MOOC course. Our counselling program took the challenge to integrate online learning into our teaching practice and develop MOOC for Helping Relationship. Traditionally, our teaching and learning strategies requires us to conduct face to face teaching activities particularly with the involvement of skills development with limited number of students. Helping relationships is vital in human interactions as it offers guideline and framework for emotional supports and create belongingness. Throughout this MOOC course, we can offer learners an online education journey through the online platform.

Why are they important to education?
In this globalization era, higher education institutions face a competitive environment that requires action such as technological-oriented strategy in academic world (Moccia, 2016). Counsellor educators in UNIMAS take this opportunity to develop MOOC courses in order to become resilience in this movement of academic world. In this digital era, the universities are visible and face a lot of opportunities and challenge (Topa, 2010). MOOCs offers the opportunities for open access education beyond our traditional classroom (Weller and Anderson, 2013). We are able to transforms beyond a normal classroom, whereby this MOOC course gave the opportunities for the students to:
- learning Human Relationships in their own time
- engage with other learners throughout online activities
- access to variety of online sources such as teaching videos, website etc

Advantages
What do we expect from this online course? It is hope throughout this course; we can reach massive number of UNIMAS students to enroll and be able to embark in helping relationship online course journey. This course is not only for achieving a good grade and certification purposes. Beyond grade and certification; we integrate technology in teaching helping relationships to non-counselling learners;
- we hope to see engineers become a good listener
- a computer science student able to show concern helping others
- resource science student able to understand about empathy
- human resource students able to offers their shoulder to cry on
- we offer human touch in various profession

Commercial Values
MOOC Helping Relationship course can offer as a paid elective course in Open Learning Platform. It is also can offers as online training course for students or organizations.

Acknowledgement
We are grateful for the opportunities to involve in the development of MOOC for Helping Relationships. We would like to thank the Dean and management of Faculty of Cognitive Sciences and Human Development (FCSHD), and Centre for Applied Learning and Multimedia (CALM).

References
BLOGGING: INTEGRATING TECHNOLOGY IN COUNSELLOR EDUCATION

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Highlights:
Counsellor educators emphasizes the element of learning reflection in teaching and learning. Basically, the counsellor trainees are required to record their learning journey in specific counselling courses, during practicum and their internship. This written assignment normally considered as confidential as it reflects the students personal experience. However, some of the experience also valuable to be shared among the counsellor trainees. The sharing sessions normally takes places during the classes and supervision session. Blogging offers the opportunities for counsellor trainees to share their experience in online platform. This initiative enriches the students experience as they can shared and communicate through online medium.

Keywords: helping relationships, professional helper, helping theories, basic helping skills.

Introduction
Blogging is of one the Web 2.0 tools that develop the students ability to share their knowledge, perception and experience with others. Blogging among students in particular subject can promote students’ reflective thinking skills (Xie, Ke, & Sharma, 2008). The blogging activities can stimulate reading and promote learning (Yang, 2009). Based on Kolb experiential learning, the students who fall in reflective observation category (Fry, Ketteridge, & Marshall, 2009), prefers to learn from logs, journal writing, discussion, brainstorming and questioning. In counsellor education, reflection is part of the importance learning activities highlighted in the curriculum based on Standards and Qualification of Counsellor Training (Board of Counsellors, 2011). It is hoped that the ongoing learning reflection through blogging will help the counsellor trainees to enhance their competencies in counselling skills and theories application.

Description of innovation.
Blogging among counsellor trainees is part of the assignment given during Counselling Laboratory Course for first year students. This innovation in teaching and learning offers the counsellor trainees to share their experience in conducting counselling session through blogging. The innovation is part of the research supported by a grant from the Scholarship of Teaching and Learning (SOTL), UNMAS. Twenty (20) students participated in this study. The participants are registered students for KMC 1063 Counselling Laboratory I (Individual) course. This study exposed the counselling trainees with guided online reflection through blogging. The sharing experience and reflection through blogging is hoped will enhance the trainee counsellor’s knowledge particularly in subject area related with counselling studies. This online reflection was divided into two phases. In the first phase, students are required to write minimum of two learning reflections through blogging. They also need to provide comment and feedback on each other blog entries. Based on the online survey on the effectiveness of blogging as a teaching and learning medium:
- 75% Students believe that incorporating blogs with teaching can enhance their learning experience in general
- 80 % Students found that the blog discussions help them to share their knowledge and experience with peers
- 81.3 % The blog helps the students feel connected with other students in this course
- 84% Blog discussions help the students to understand other points of view

During the second phase, the students received a feedback from the lecturer after the completion of assignment and examination. The students received written comment and feedbacks on their blog entries and some of the students need to improve their blog entries (for example: they need to relate the concept with their experience in conducting counselling sessions). Additionally, some of the students need to write a learning reflection through blogging based on their performance in their final exam. They need to improve their understanding on specific topics (related with counselling theories). They need to find additional information related with the topics and shared in the blog (either new blog entries or give comments). As a conclusion, this online reflection not only involve participation from counselling trainees but also continuous feedback from the lecturer based on the performance of each students.

What is the context or background of the innovation?
The teaching and learning strategies in counsellor education involve activities such as case study discussion, small group activities, role-play, mini lecture, video demonstration and also journal reflection. Beside class activities, the counsellor trainees also need to complete hours for face to face counselling sessions with real clients. In this course, the counselling trainees are required to apply counselling theories in their counselling sessions. The counselling sessions
were conducted at least for five sessions, recorded and submitted with counselling report. The application of counselling theories in counselling sessions are crucial element in counselling education.
Most of traditional journal reflection activities in counsellor education involve written and verbal learning reflection. In this innovation project, the counsellor educator embed blogging as a tool for journal reflection activities. Social media and Web 2.0 tools is part of the teaching and learning activities embed by the lecturers in their class activities (Wiid, McCormack, Warren, Buckley, & Cahill, 2013). In this SOTL Project, students are required to write two-blog-entries related to an assigned counselling theory in the class. The students are divided into three groups based on selected counselling theory. The theories are Person Centred Theory, Reality Therapy and Rational Emotive Behaviour Therapy (REBT). The students need to write a learning reflection based on their experience in conducting counselling sessions and further reading regarding specific theory. They also need to give comment and feedback to their friend’s blog entries. This initiative not only benefit the counsellor trainees who participates but also to the counselling trainees out there who able to reach the blog.

Why are they important to education?
Counsellors in this globalization era faced a challenge to accommodate the counselling services with recent development in social media and technology. The counsellors are not only offering their services in face to face environment, but also through online medium. For example, American Counselling Association (ACA) counsellors were actively sharing their experience, knowledge and thought through the ACA blog which is http://www.counseling.org/news/blog. This journaling experience through blogging provide as a platform for counsellor trainees to venture in real social media activities. It also gave the opportunities to share application of counselling theories in online medium. Counselling trainees can learn from each other not only during the class session. Reflection on being a counsellor, skills used, and theory application elements may help trainees to perform the same process in their own counselling sessions. This experience also encourages the counsellor educators creatively to customize the reflection activities to achieve the learning objectives.

Advantages
What do we expect from this blogging activities? The students who benefit this reflection and online sharing sessions are not only for this group. Their counselling trainee seniors and juniors also can reach the blog post and gain the understanding and see the uniqueness on how the counselling theories were applied in the counselling sessions. They also shared materials such as brochures, posters and handouts. As a consequence, the counsellor trainees will be able to creatively create their own counselling materials. This blog post also serves as medium for counsellors out there to learn continuously from online sharing and materials. The online communities also can learn application of specific theories in related issues. The blog post may educate and gave awareness to the online communities about helping and counselling.

Commercial Values
Blogging may invite sponsor from specific products related with counselling and education.

Acknowledgement
The research was supported by a grant from the Scholarship of Teaching and Learning (SOTL) Grant, UNIMAS (F04/SoTL/1473/2016). We would like to thank The Centre of Applied Learning and Multimedia (CALM), UNIMAS for initiating and this research opportunities.

References
COMMUNITY BASED PROJECT PROBLEM BASED LEARNING IN ECONOMICS CURRICULAR

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Highlights: The approach of CBPoPBL applied in the economics study has open up a new experience to the students enrolling in this programme to foresee great experience obtained thus as well appreciate the knowledge better than ordinary classroom approach. The approach does help the students to appreciate their roles as an economist in the real work market and made them more enthuse towards the remaining years studies by focusing on the actual need of their market. More than 90% of the students prefer the unique approach but still some small in numbers remaining prefer to have just the ordinary classroom teaching. Also huge percentage of students benefited this approach as they learn more than what an ordinary classroom gave them especially thru the community based project approach applied in the course. Yet, there are more to explore and future enhancement of the pedagogy shall bring more futuristic approach in making economics as a fun program to enrol in.

Keywords: economics; community based; PoPBL; assessment

Introduction
The shock that our education has experience in the past years is the shortage of funding in operating the university and college until the extent to close a programme which does not relevant to capital building. Economics programme has been brought up to the issues thus been questioned towards the relevance of this discipline in the picture of the current capital development. Experience with the general public in Malaysia, has shown that the confusion of economics study with finance; in which I won’t blame them totally for the misperception. One should understand, economics is the study of how societies use scarce resources to produce valuable commodities and distribute them among different people. It’s a management of resources study that is important to be learnt in ensuring a right decision will be made for the benefit of all. Students will be trained to be a good decision makers and will learnt an essential decision making tools and knowledge, thus not about managing money alone. CBPoPBL is a pedagogy that does expose the students with real life problem faced by the management within the community either the business community or the rural community and even local administrative group. This approach will problem solving is an effective strategy to help students construct their concepts, better understanding of applying the concept learnt for different scenarios which is better than case study where the creativity will be enhanced. This approach does encourage the students to study other discipline of knowledge, preparing them being the well verse human capital. UNIMAS economics CBPoPBL has managed to create mobile apps in one of the semester that solves the problem faced by their client.

Content
Develop approach of introducing economics problems for a project, different from writing a case study approach. Unique assessment activities in capturing the actual CLOs and PLOs of the course and programme. Enhance better understanding and even level of creativity in learning an economic subject. Produce products at the end rather than a model, which could be applied/practice by the community. The output of the approach has enabled the innovated product to be applied by the community/ business in their daily operation. Some even interested to purchase the product to be applied.

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References
UTLC WATCH

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Highlights: UTLC Watch is a digital data centre that harnesses the powerful tools of data mining, data visualization and data analytics to assist in summarizing, visualizing, tracking and identifying data related to teaching and learning in Universiti Utara Malaysia.

Keywords: learning analytics, data analytics, data mining

Introduction
Malaysia as a nation that moves forward into a different world in 2050 require a major shift in governance services and educations. Academicians inspire learning, create and share knowledge that form the backbone of Malaysia’s knowledge economy. The important roles and vital contributions of academic staff and institutional leaders in Malaysia’s Higher Learning Institutions are recognized in Shift 2 of the Malaysia Education Blueprint (2015-2025). UTLC Watch comprises of three main modules namely the UUMOL Quick Feedback, Academic Profiles (AcaProf) and UTLC Analytics. The first module is UUMOL Quick Feedback. UUMOL Quick Feedback is a module offered in UTLC Watch that allow the user to give instant feedback to UUM Online Learning facilities. These include login problem, download/upload problem and other related problems to teaching and learning online facilities. The second module is known as AcaProf. AcaProf integrating data from many resources such as lecturer profiles, lecturer training, teaching and learning workshop information, online learning, MOOC, blended learning and Outcome based Education (OBE). The last module is known as UTLC analytics. This module provided the analytics details of the data from UUMOL Quick Feedback and AcaProf modules. These include data summarizing, visualizing, tracking and identifying academic talent development. UUM Watch offer an analytic dashboard that capable to summarize the whole teaching and learning data. By providing a systematic platform to collect feedback, managing and integrating data, profiling lecturer preferences in teaching and learning can contribute the talent development that builds the nation and future leaders and generation. Managing teaching and learning data is a challenge faced by many universities. Understanding these data will help the university to plan and produce a better teaching and learning strategies and directions.

Usefulness
UTLC Watch has uniqueness especially in terms of the used of open source software that is platform-independent. One of the most significant advantages of this feature is its ability to move easily from one computer system to another. The ability to run the same program on many different systems is crucial to World Wide Web software. The algorithm developed with the UTLC Watch modules are easy to integrate into various data mining software. This system can be utilized by most of the lecturers/academician at higher learning institution as the user interface for the system is easy to use and navigate. The visualization modules offer a better understanding of teaching and learning data in a simple touch and clicks. Data integration within UTLC Watch modules provide an opportunities for the university management to understand their data in a simple and meaningful ways.

Commercialization Potential
The UTLC Watch was developed using Microsoft 365 applications. Microsoft 365 offer facilities for integration with various data mining software such as SAS Enterprise Miner, Python, WEKA and Clementine. UTLC Watch has a very good potential to be commercialized, as it is practical to solve the problem of handling data in an integrated manner that a more systematic, paperless information can be documented in a massive form albeit easy access using technology which eventually reduces carbon footprint whilst providing economical alternatives to HE in Malaysia and possibly may be commercialized as an income generation to the local institution if not our country. By so doing this project could provide revenue for the nation.

Acknowledgement
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References
VIRTUAL REALITY AS A LEARNING MEDIA TO IMPROVE BASIC
MATHEMATICS SKILLS AMONG PRESCHOOLERS

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Highlights: “Virtual reality” (VR) is the evolution of the computer science field which combined the real-world and computer-generated data. Numerous virtual reality projects have been applied into the education system to ease and create more realistic learning environment for the students. This project is mainly focusing on teaching and learning basic Mathematics skills among pre-schoolers according to the current syllabus. The augmented environment is implemented to create an alternative platform for children age 4-6 years old to learn basic Mathematics skills and apply them into their real-life situations. The findings show that the project superior results compared to traditional methods.

Keywords: Virtual Reality, Pre-schoolers, Augmented Environment, Mathematics skills

Introduction
Technology has been developed rapidly in the 21st century which takes users from the youngest age to the eldest into immersion of the smart devices, internet and online interaction and this has been advantages for new generation to use and maximize the use of technology in every aspects of their life (Leeming, 2018). Moreover, effectiveness in education can be enhanced by taking full-advantage of these smart devices and implement the e-learning contents into education system. The use of smart devices also eases the work of providing data, methods and learning media for educators as they are designed to implement the traditional way of teaching into the technology (Yang, 2014). Preschool education in Malaysia is a year or more period of study program that suits children form ages 4 to 6 years old as a basic foundation study and school experience before they are eligible to be enrolled into primary school (Mustafa & Azman, 2013). The Education Ministry of Malaysia has standardizing the education system and learning materials for the preschool to ensure every child are receiving the equal education and well-equipped with basic knowledge before entering the Year 1 study.

The main purpose of this project is to create a new environment of interactive learning method into Malaysian preschool education system, specifically for the Mathematics subjects. The new platform to be implemented into the education system is known as virtual reality environment – a virtual world of learning media that deliver synchronized scene to user, client and server in which enable them to interact among themselves in a virtual environment. The project involves Malaysian preschoolers and the educators from the collection of information on the preschool Mathematics syllabus until the development of a virtual learning environment for them. Barooody (2000) mentioned that variety of mathematical technique and understanding tool need to be developed by the preschool children to allow them expose, explore and develop critical thinking in solving Mathematics. The contents and learning materials in the virtual reality application are based on the current syllabus of Malaysian preschools system, in order to meet the needs and qualification for them before entering the primary school.

Background of the project
According to a report by Kementerian Pendidikan Malaysia in 2000-2013, the Malaysian primary school students, a huge number of 100,000 of them are having poor performance in Mathematics subjects. This also results to the encounter of the problems in mastering reading without spelling, writing based on their understanding and mathematics solving. The greater struggle to survive in applying Mathematics skills in the high school phase will be faced by the children who fail to achieve good grade in their academic during foundation years of preschool (Lyon et al., 2001). This is due to the basic skills in the early education has not been mastered by the children in their preschool phase. However, this failure eventually manageable once the children are able to associate and adapt the mathematics skills in their routine life (Majzub, 2012). The ability to associate and adapt to the solving skills can be enhanced through various numbers of teaching and learning techniques which suitable to the children aged 4 to 6 years old. This comes to the idea of creating a virtual reality environment as a new learning media for children to learn basic Mathematics skills such as learning numbers, shapes, addition and subtraction.

This project acts as a testing out approach in the education system for preschooler. Previously, studies have shown that preschoolers or children at this age are able to communicate and interact with smart devices without any problems which come out to the hypothesis that they are also able to learn Mathematics better through virtual reality
The users are able to immerse themselves into the virtual world and explore various simple tricks of Mathematics to enhance their skills. Hopefully, the product of this project will be beneficial and acts as an alternative platform to teach and learn Mathematics among preschoolers.

**Methods and Findings**

This project has been involved children aged 4 to 6 years old and the educators in Malaysia preschool education system. The random sample of preschoolers is chosen in the classroom as the personnel and background information is not been specified and acknowledged for this project. The educators are involved as in data collection of their preferences for the virtual reality environment as learning media in classroom. The data collection regarding latest syllabus and statistics on preschooler’s achievement in Mathematics is collected from the Education Administration known as Pejabat Pendidikan Kota Samarahan. The data has been collected is the current syllabus of Mathematics subject for public preschools in Malaysia based on the education system set by the government.

A storyboard is used to create a flowchart of the system. This includes the user interfaces, interaction and the overall flow of the system. The environment of this virtual reality application is based on 360-degree rotation system, where the contents of a specific scene located around the virtual world. The camera manipulation plays a role of determining the scene view shown on the screen. As this is a learning purpose application, the 3D environment has a plain-colored background that suitable for young aged children. The background colors chosen are mainly light color and having contra to any wording or object surround the virtual environment. The chosen of the color is done to meet the cognitive affordance visibility as lacking in this feature will results in objects invisibility due to not displayed or occluded by another object.

The virtual reality application is evaluated by using System Usability Scale (SUS) developed by John Brooke in 1986. This scale consists of 10 questions that related to the developed system, where each question has five options of scaling from strongly disagree, disagree to strongly agree. The calculation of total score will give an overview either the usability needs works or not for the users. The SUS questions are given to the respondents after they are done evaluating the virtual reality application. The students are guided throughout this evaluation as they may have difficulty to understand the questions by themselves. The results of the SUS score out of a full score of 100. The SUS score is an indicator of the system either it managed to meet the usability needs or it require fix. With the average score of 71.25% from the teachers and 64.56% from the students, the developed virtual reality application for preschool Mathematics subject achieve good score with a need for more improvements and updates according to the suggestions given by the teachers.

Future work may include additional accessibility features for the learning system to meet more demands and requirements in the latest standard of the school system. First of all, the Multilanguage settings such as English, Malay and Mandarin should be added in the system. Referring to the expert’s suggestion, preschoolers learn Mathematics in both Malay and English simultaneously, and Mandarin as bonus language for certain preschools. This will help the preschooler in discriminate their learning materials in different language, as well as much more understanding and vocabulary during this age. This project can lead to a new education trendy for public and private schools to explore the effectiveness for using the augmented environment as a learning media. From the commercial prospective it is a good direction to invest money to enhance the performance of Education in Malaysia and the whole world.

**References**


Yang, Y. K. (2014). Effectiveness in education can be enhanced by taking full advantage of these smart devices and implement the e-learning contents into education system. The use of smart devices also eases the work of providing data, methods and learning media for educator. Korea Science & Art Forum, 15-319.
iARPA: INTERACTIVE AUGMENTED REALITY LABORATORY MANUAL FOR PRINCIPLE OF AQUACULTURE COURSE

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Abstract
Educators and technical developers are beginning to adventure the capabilities of Augmented reality (AR) technologies to enable new forms of learning in various fields. An increasing number of applications that use virtual reality technology have appeared in the classroom recently. AR uses humanized and interactive operations to allow students to learn from a total immersion experience. Integrating unique features of AR by augmenting the physical note pages into a dynamic, fun and interesting learning experience for the student. (iARPA) was designed based on a complete course content. It provides an interactive AR laboratory manual for teaching Principle of Aquaculture course. iARPA assists students to understand and visualize information of the 3D fish image, pond structure and aquaculture management. It also provides student a tangible interactive interface enhancing spatial memory toward flexible education. Development of iARPA comprised of three phase namely i) system design and development of AR technology, ii) implementation of iARPA manual book, and iii) assessment. iARPA would be beneficial to enhance the teaching and learning method. In addition, it provides an engaging experience to the students to learn the principle of aquaculture as compare to the traditional methods.

Keywords: Augmented reality, teaching tool, laboratory manual, aquaculture
WE LOVE YOUR MOOC SIR: HOW TO DESIGN FUN AND FAST TASK-BASED ONLINE LEARNING ACTIVITIES

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Highlights:
Massive Open Online Courses (MOOCs) has revolutionized higher education by offering richer wider, and connected learning experiences. Our study embarks on the following objectives: To identify the nature of learning activities that highly engage MOOC students and to investigate the level of engagement among students towards difference MOOC learning activities. We carried out a study to identify the nature of learning activity on MOOC and how the students responded to it. To investigate the level of engagement among students towards difference MOOC learning activity, we conducted an online questionnaire with 741 participants that enrolled Multimedia Technology UNIMASMOOC. In general, their satisfaction levels are high. We conclude with implementation for future research.
UTILIZING ELEAP FOR OPTIMIZED CLASSROOM PARTICIPATION FOR ENVIRONMENTAL CHEMISTRY 1 COURSE

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Highlights: Blended learning was designed utilizing eLEAP platform for the delivery of Environmental Chemistry 1 course to BSc(Hons) Resource Chemistry second year students in Universiti Malaysia Sarawak (UNIMAS). Bring Your Own Device (BYOD) concept was practiced to optimize the classroom participation in all face to face (F2F) guided learning sessions through eLEAP. Activities include group discussions, e-forum, e-seminar, mind-mapping activities, glossary, collaborative assignments, and video making sessions. Students feedback on the overall quality of learning teaching approach was obtained through course evaluation form, and majority of the students gave positive feedbacks on their learning experience in these courses.

Keywords: Learning management system; eleap; chemistry, blended learning, BYOD

Introduction
Blended learning is a hybrid teaching approach that combines online and face to face (F2F) instruction (Reay, 2001) and interaction during learning process. Studies showed that redesigning courses using blended learning could lead to enhanced learning experience for students in terms of learning satisfaction, retention, and classroom space utilization and interaction with peers and the instructor (Dziuban et al., 2006; Owston et al., 2019). In this study, the delivery of Environmental Chemistry 1 course, which is offered for second year students of BSc (Hons) Resource Chemistry programme in Universiti Malaysia Sarawak (UNIMAS), was redesigned. This course deals with the chemistry of water, soil and the atmosphere. The origins, transforms and movements, reactions, effects and fate of chemicals in both the water and the atmosphere are the major areas covered in this course. By the end of this course, students will be able to analyze the major environmental components (course learning outcome (CLO)1), justify environmental impacts related to the environmental components (CLO2), and finally plan strategies for mitigating environmental issues (CLO3).

The course was previously taught by giving a 15-20 minutes lecture or video related to the content followed by group discussion with guiding questions, and the cycle was repeated until the targeted course content has been covered. Previously, eLEAP platform was used only for sharing learning materials and assignment submission. However, instructor’s observation shows that many students were lacking in focus and participation during group discussion session. Thus, the Environmental Chemistry 1 course delivery was redesigned by utilizing UNIMAS learning management system, eleap, to optimize students’ classroom participation.

Results
Students feedback on the overall quality of learning teaching approach was obtained through course evaluation form, and majority of the students gave positive feedbacks on their learning experience in these courses. Before implementation of blended learning, the average mark given by 38 respondents to instructor was 84.21%, while average mark given for their online learning environment was 85.53%. After the implementation of blended learning in classroom, average mark (37 respondents) for instructor was slightly higher (89.08%). Interestingly, average mark given by students on their online learning environment reduced to 80.92% after blended learning was implemented. There is a high degree of complexity in terms of legitimacy and acceptance of instructors and learners when online environments are integrated with traditional F2F settings (Stacey and Gerbic, 2008). Some feedbacks from students, before and after the blended learning implementation are as follows:

[i] Before:
[Perceived CLO achievement CLO1: 85.47%, CLO2: 85.47%, CLO3:84.11%;
Actual CLO achievement: CLO1: 97.37%, CLO2: 100%, CLO3: 92.11%]
1. It was a fun and interactive class. 2. [The instructor should] make a good environment by creating a group discussion among students in the class. 3. The lecturer should give more exercises and discuss the answer in the class to make learning more effective. 4. Use more videos and quizzes. Less group activities.

[ii] After:
[Perceived CLO achievement CLO1: 88.02%, CLO2: 87.81%, CLO3:85.54%;
Actual CLO achievement: CLO1: 97.30%, CLO2: 100%, CLO3: 81.08%]
1. The lecture was great and fun! The online quizzes and the group activity such as video presentation were really helpful to give more exposure and understanding about the course. I had a really good time in the lecture session throughout the whole semester.  2. The lecture and exercises during class help me to understand this subject.  3. My course instructor encouraged us to think and read more, especially through online research.  4. I’m sorry to say this, but I prefer lecture kind of class instead of having us to make video for every lesson because some of the content delivered is not clear enough for my understanding.

**Conclusion**

Overall, redesigning the course delivery for Environmental Chemistry 1 using blended learning via eLear results in improved classroom participation, student satisfaction on the instructor’s delivery, and the students’ perceived CLO achievement. On the other hand, the actual CLO achievement remains for CLO1 and CLO2, and decreased for CLO 3 after implementation. In this case, students’ rating on their online learning experience also decreased after blended learning was implemented. Thus, it is recommended that students’ readiness, maturity, and expectations for blended learning must be set clear before the blended learning implementation. Ample time must be allocated for course planning by instructor. Consistent and transparent feedback from students are also important for them to maximize the benefits gained through blended learning.

**Acknowledgement**

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**References**


EDUCATION ANALYTICS IN UPM SMART CAMPUS

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Highlights: UPM’s smart campus is constituted of various components namely human, infrastructure, infrastructural, financial and management support and the students. Education analytic is one of the main drivers of UPM’s smart campus initiative. This paper introduces the UPM smart campus specifically the education analytic approach led in UPM by the Centre for Academic Development.

Keywords: Education analytic, smart campus.

Introduction
In the advent of the Industrial Revolution 4.0 era, artificial intelligence plays an integral part in the ecosystem to bring out more value so that the quality of services, achievements and comfort would improve. Big data management and strategic information planning are the pre-requisites of an effective artificial intelligence utilization in any organization. Several literatures have emphasized on transforming smart campus into a mini smart metropolitan city through an array of intelligent systems. This includes the utilization of internet-of-things such as real-time bus arrival tracking, cloud-based facilities finder and booking, traffic control and parking management. Cloud technology is also used widely such as the digital identity card, smart wallet to reduce dependency for cash transaction, personal digital assistants which act as reminders for various tasks and mobile apps which assist cross-campus communication. Shifts towards resource optimization have also been in place such as through the co-sharing of software licenses across campus and cloud-based virtualization.

The uniqueness of the smart campus innovation is the intelligent education analytic (as in Figure 1) which comprises of the admission and enrollment, human resource planning (covers the teaching, support staffs’ administrative workloads), financial and budgetary, learning management system, curriculum management, graduates’ performance (academic and non-academic), graduation and alumni, and quality control. Scoping towards the advancements in intelligent learning management system, various initiatives and studies have been in progress ranging from intelligent tutoring system, early performance prediction, course retention and completion analytics, and recommendation system for personalized learning materials. Recently, there are more acceptance towards robots that act as teaching assistants which could answer students’ queries such as regarding assignment submissions and to advise the students whether their performance is at par or below average. Other efforts include integrating ambient and wearable sensors to adaptively support the instructors to optimise teaching delivery as a smart learning environment.

Connectivity, interactivity and integration are the basic infrastructural and infostructural elements of Universiti Putra Malaysia (UPM) smart campus. These elements are complemented by the entities that constitute a campus ecosystem, such as the students, educators and administrators. UPM’s smart campus initiative emphasizes on the data value through assortment of intelligent systems such as Putra Virtual ID (PutraVID), staff performance management system (HiStaf, eLPPT and ePresiasi), Putra Learning Hub (Ismail et. Al, 2017), Putra Outcome Based Education Reporting System, Retirement Management System, eSenat, ICT Services Sistem and Community and Industry Network Intelligent Sistem (ICRIIS), and research performance management system (PRIMS). All the online systems in UPM is integrated and accessible through the Single Sign-On utility.

In relevance with the technology for supporting UPM Smart Campus, the effectiveness of the lecturers’ teaching development is addressed by the Centre for Academic Development (CADE) through series of continuous professional development courses. Each of the lecturers’ training session is designed according to a planned transformation program for the development of knowledge, skills and competencies according to five themes namely innovative pedagogy, technology integration in Teaching and Learning (TnL), educational research, supervision, mentoring and extension, and ethics and professionalism. Response and observations from each training participation is analysed to incrementally improve the next session.

Besides the training programme, CADe is also spearheading the learning analytic as it oversees the online learning management systems in UPM (i.e., PutraBLAST, PutraMOOC, PutraOCW, PutraBLASTArc). e-Learning is a staple of teaching and learning (TnL) activities in Universiti Putra Malaysia. Besides the formal learning management system, various applications have been used for supporting TnL activities such as communication, collaboration, composition and information searching. The average blended learning usage at the university level has also surpassed the national’s benchmark. Several factors are contributing towards this scenario such as [i] courses for early career
lecturers (e.g., how to use Student Information Management), (ii) training programs related to eLearning for all categories of service (e.g., Technology Enhanced Active Learning, Online Learning, and PutraBLAST), (iii) formation of teaching innovation committee members as faculties’ representatives (e.g., fellow, committee for innovation in TnL), (iv) university-level annual competition of TnL (i.e., PiCTL), (v) TnL innovation grant, (vi) positive recognition towards eLearning practitioners, (vii) infrastructure and infrastructure for eLearning (e.g., Putra Learning Hub), (viii) sharing of eLearning best practices (at faculty and university level) and (ix) gradual analysis of eLearning usage, skills, satisfaction and competencies.

The framework used for the analysis of eLearning usage, skills, satisfaction and competencies is comprised of a set of data collection methods such as online questionnaire, online learning management system usage reports, interview with key practitioners of innovative pedagogies and eLearning tools, teaching portfolio, discussion and observation. The collected data are analysed through various techniques including descriptive statistics and correlation. The results are indicators of perception, acceptance, readiness and practice which are useful in resource planning tasks such as subscription of software and training planning for certain skills development.

Both students’ and lecturers’ usage of the PutraBLAST is analysed through the Online Survey and Reporting system (OScAR). Trend analysis across semesters is conducted through the data stored in the archive service (PutraBLASTArc) to detect the shift of patterns to understand the evolving practice and readiness on blended learning. Students’ satisfaction data collected through OScAR is also analysed on semester basis. Collected responses from occasional surveys conducted to study the pedagogical best of practice are also compiled and presented at managerial level for strategic planning. All these has supplied towards the continual quality improvement of educational programs in UPM. Various techniques have been applied depending on the nature of the data including descriptive statistics for exploratory analytic, correlation coefficient, and regression model.

Moving forward, further advancements of artificial intelligence specifically data analytics can be applied for proactive decision making including personalizing training for human capital development and optimizing training schedule.

Figure 1: Examples of education analytic for higher education institution

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References

REVOLUTIONIZING LEARNING ENVIRONMENT WITH ARTIFICIAL INTELLIGENCE

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Highlights: This paper presents the design of an Intelligent systems for future learning ecosystem which combines internet of things, learning analytic and chatbot for the purpose of improving learning satisfaction, engagement and effectiveness. Various methods are employed including collaborative and personalised learning, visualisation informative through web dashboard, and predictive analytic and chatbot through machine learning. The prototype of the intelligent system is to be implemented in a future classroom facility in UPM.

Keywords: Artificial intelligence, future classroom, internet of things, learning analytic, chatbot.

Introduction
In the advent of the Industrial Revolution 4.0 era, artificial intelligence (AI) plays an integral part in the ecosystem to bring out more value so that the quality of services, achievements and comfort would improve. In intelligent learning management system, various initiatives and studies have been in progress ranging from intelligent tutoring system, early performance prediction, course retention and completion analytics, and recommendation system for personalized learning materials. Recently, there are increasing acceptance towards robots that act as teaching assistants which could answer students’ queries such as regarding assignment submissions and to advise the students whether their performance is at par or below average.

At the Universiti Putra Malaysia (UPM) various data analytic techniques have been applied in learning management including descriptive statistics for exploratory analytic, correlation coefficient, and regression model of online learning management systems usage, staffs’ development programs and students’ satisfaction. A recent effort in UPM that applies AI on internet of things focuses on the proactive and adaptive based lesson planning. Among the objectives of this effort is to address the requirement by the lecturers who desire to design meaningful teaching delivery personalized to the students’ needs and to fulfill the course’s learning outcomes. The presented research in this paper is one of the components in a research on future learning ecosystem, where the other two components are curriculum and learning space design.

The delivery of a lesson is currently usually a one-size-fits all approach since a huge effort need to be performed by the lecturer to get information about their students to tailor a lesson plan suited to their needs. Although learning activities and assessment are the common cycle of teaching and learning, no existing mechanism is available to monitor, learn and make use of the learning dynamics of both the students and the instructor. Lesson delivery is confined to the comfort-based choice of the instructor without insightful based consideration of the students evolving needs. Some lecturers claimed that they do not have access to student’s data (e.g., contextual, performance, preferences). Besides, the teaching method and classroom environment that attribute to the students performance have never been taken into account. Existing computational system has not been designed to meet these requirements, whilst in this revolutionary era for education, digital-based recommendation to assist lecturers are on demand. This limitation has resulted to unoptimized learning engagement, satisfaction and performance. There is also a need to match the students’ expectation of engaging learning.

Therefore, this research embarks on a cloud-based IOT driven learning space prototype to enable a more immersive environment/space for pedagogies of the future. The objectives of the research are as follow:
To understand learning satisfaction, engagement and achievement through an intelligent IOT-for-classroom prototype by:
- developing a data-driven learning space technology solution
- profiling the learning behavior of the students
- To model intelligent IOT-data driven classroom prototype for effective learning
- To develop a cloud-based IOT-for-classroom solution playbook

The intelligent IOT-data driven classroom prototype will be developed based on the integration of ambient (room temperature, room humidity, CO2, lighting), wearable sensors (brain wave, heart rate, accelerometer, gyroscope) and
a lesson planner app. These data will be visualized in a dashboard as a reactive intelligence so the lecturer could control the environment ambient comfort. The data from the wearable sensors will provide alert should the values are beyond benchmark. The lesson planner app will support proactive intelligence for lecturers to design their lesson by referring to the predicted students’ and staffs’ satisfaction, students’ learning performance and class engagement. The prototype will consist of visualization informatic, predictive analytic using machine learning algorithms and deep learning based chatbot.

The prototype is distinguished from existing solutions which exist in isolated nature and do not tailor to the purpose of designing an effective learning. The research also integrates several data modalities (wearable sensors, ambient sensors, lesson plan, and learning satisfaction) for the learning analytic purpose. Existing though scarce studies in learning analytic (Davis, Chen, Hauff, & Houben, 2018; Gallego-dur, Villagr, Satorre-cuerda, Molina-carmona, & Compa, 2017; Schumacher & Ifenthaler, 2017; Vahdat, Oneto, Anguita, Funk, & Rauterberg, 2016) have been confined to (i) detecting at-risk students, (ii) predictions of the students’ grades at the end of the term, and (iii) visualizations and outline descriptive information such as time spent online, access of resources, progress towards the completion of a course, and comparisons with other students. The existing studies have been utilizing only the online learning pattern, student profile, learning performance and delivery method. Besides, studies on chatbot (Molnár & Sz, 2018) for education have been solely as teaching assistant (e.g., answering queries, reminder for tasks and advising students when their performance is below average) and none has the function similar to the proposed research.

On the other hand, the IOT-for-classroom technology has been focused on equipping the classroom with electrical appliances that could support diversity of learning styles and to effectively recognize learner actions and infer learner context information. Smart classroom has been installed with smart boards, video camera and dashboard for controlling the ambient sensors (such as lighting, temperature and CO2). Works that focus VR headsets and smart glasses aim to provide students with in-depth sensory to create “hands-on” experiences for students in such disciplines as medicine, engineering, physics, geography, art and history. Brain-sensing headbands monitor the wearer’s brain activity, giving insights on attention span, anxiety levels and more while fitness wristbands can track students’ physical activity, movement around campus, vital signs and sleep habits, among other things. Smartwatches could link student directly to an institution’s student information system, allowing wearers to receive instant notifications, reminders and announcements. However, the studies in this field (Lu, Zhang, Zhang, Xiao, & Yu, 2017; Mehmood & Lee, 2017) have been mostly on sensor-based learner context collector such as for modeling and detecting student action (e.g., attention and interest level) and not combined with the learning analytic features.

The research will be conducted through four phases. The first phase focuses on the planning and design. The second phase will be spent for designing the mobile apps and web dashboard, besides collecting data through case study. The third phase will focus on the learning analytic model development and collecting further data. The prototype integration will be performed in this phase. The final phase will be for testing the complete prototype as a future learning ecosystem model. The outcome of the research will be an example of technological fitting in future learning ecosystem.

Acknowledgement
We are grateful for the Malaysia Research University Network Grant entitled Enhancing Education for Human Capital Development through Establishing Future Learning Ecosystem which is supporting this research.

References
JUNIOR DATA SCIENTIST E-PORTFOLIO DEVELOPMENT THROUGH CHALLENGE BASED LEARNING APPROACH IN DATA MINING COURSE

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Highlights: This paper presents the development of a challenge-based learning (CBL) approach for producing junior data scientists which comprises of a hybrid of the standard CBL framework with inquiry-based learning, problem-based learning, project-oriented problem based learning and experiential learning which are conducted through a series of activities and assessments in blended learning environment towards achieving the targeted course’s learning outcome. This approach has been refined over four years of Data Mining teaching experience by considering current students’ learning needs and preferences, achievement, observation during students’ engagement, feedback and reflection, advice from mentors and industry partners and latest computer science skills demands.

Keywords: Challenge based learning, Data Mining, Blended Learning

Introduction
Data science jobs are among the highest paying jobs around the world but according to KPMG CIO Survey, there is a massive talent gap. This indicates that Universiti Putra Malaysia (UPM) graduates could tap into these vacancies. In order to produce quality students in this area, the course delivery should be meaningful for the students. Data Mining is a course that requires the students to have a mixture of skills ranging from statistics, data management, machine learning, visualization and decision making. Challenge based learning (CBL) approach is very suited to these millennial students. CBL approach is applied in the Data Mining course at the UPM to support for meaningful learning experience because this delivery method is student-driven (as their learning evolve according to their progress in the challenge engagement, investigation and act).

The objectives of this initiative are (i) to support for meaningful learning experience through delivery method that is student-driven; as their learning evolve according to their progress in the challenge engagement, investigation and act. As there is close industry exposure, students will have better preparation for real-world requirements, and (ii) to produce graduates with future ready attributes as the steps in this initiative allows them to investigate the suitability of their solution to solve their defined challenge so they will develop critical thinking, creative and collaboration. When the implement their solution, they will develop communication, civic and character.

As there is close industry exposure, students will have better preparation for real-world requirements. The other objective is to produce graduates with future ready attributes, as the steps in this approach allows them to investigate the suitability of their solution to solve their defined challenge so they will develop critical thinking, creative and collaboration. When the students implement their solution, they will develop communication, civic and character. Students are introduced to the science and art of decision making by utilizing data mining techniques and peeragogy technique is explained so they could work collaboratively effectively. Inquiry-based learning and experiential learning are also embedded throughout the semester. Students are also exposed to multidisciplinary problems through learning from their friends besides having to disseminate their discoveries in their blog and video as e-portfolio to demonstrate their acquired knowledge and competencies (steps of implementation as shown in Figure 1 and Table 1).

To be able to simulate the authentic experience, the students are required to select an industry, identify the current issue and get related dataset. Then, they are expected to pitch their innovative idea. Other participants (students, mentors, industry partners and instructor) would give feedback to the idea, to be deliberated by the group. Students also equip themselves with technical skills including programming language, data analysis, machine learning algorithms development, data mining tools, result synthesis and result presentation. The students’ products include pitching, reports, dataset, videos and blog. In the videos, student need to pitch, demonstrate their data processing steps, data design, explain their developed model and the results; as well as how it relates to the decision making in the industry.

Padlet and WhatsApp are used for additional communication means besides the university’s learning management system (i.e., PutraBlast). ThingLink, Mentimeter and Popplet are used in collaborative purpose activities. Materials about core data mining skills such as R and Python are disseminated through Padlet and PutraBlast. The CBL method has encouraged for more student co-curated modules and videos. Group discussion and presentation of algorithm usage are conducted through web conference as attainment checkpoints while role play is conducted for essential questions construction. Treasure hunt and gamification are implemented for immersive learning. Student must develop pitching video for presenting their innovation idea and create a blog as e-portfolio for their junior data scientist experience. Students also provide step-by-step demonstration of their solution through various knowledge
presentation techniques in the blog besides providing reflection of their learning journey. The next course of this research will be to investigate the CBL method suitability and extendibility to other courses.

Table 1: Teaching Plan for Data Mining course

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Problem based Learning</th>
<th>Project based Learning</th>
<th>Inquiry based Learning</th>
<th>Experiential Learning</th>
<th>Challenge based Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch1: Introduction</td>
<td>Discussion based on Academic Publication</td>
<td></td>
<td>Debate</td>
<td>Step 1-Experience: Discussion, assignment (identify industry latest challenge and data mining tools)</td>
<td>Engage</td>
</tr>
<tr>
<td>Ch2: Data Mining Tasks</td>
<td>Collaborative Image Annotation + Collaborative Concept Map + Gamification</td>
<td></td>
<td>Socratic questioning</td>
<td>Step 1-Experience: Pitching and dataset identification</td>
<td>Engage, Investigate</td>
</tr>
<tr>
<td>Ch3: Data issues</td>
<td>Memory matrix</td>
<td></td>
<td></td>
<td>Step2-Experiment: Dataset processing</td>
<td>Investigate Act</td>
</tr>
<tr>
<td>Ch4: Data preprocessing</td>
<td>Gallery walk</td>
<td>Pitching</td>
<td>Treasure Hunt</td>
<td>Step2-Experiment: Data mining implementation</td>
<td></td>
</tr>
<tr>
<td>Ch5: Classification</td>
<td></td>
<td>Demonstration through blogging</td>
<td>Station rotation</td>
<td>Machine learning model development</td>
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<tr>
<td>Ch6: Association rules</td>
<td></td>
<td>Demonstration through blogging</td>
<td>Think Pair Share</td>
<td>Result analysis</td>
<td></td>
</tr>
<tr>
<td>Ch7: Clustering</td>
<td>Fishbowl</td>
<td>Demonstration through blogging + Presentation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Framework of CBL for Data Mining Course
Acknowledge
Thank you to various parties involved throughout the Data Mining course for these four years: colleagues at the Faculty of Computer Science and Information Technology, friends from industries and students.

References
TEACHING INORGANIC CHEMISTRY USING MOOC

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Highlights: Many people always have an impression to inorganic chemistry course where by the subject is very hard to understand. Indeed, within the chemistry subjects taught in Universiti Malaysia Sarawak (UNIMAS), the students showed low interest to inorganic chemistry. Thus, in order to enhance the students’ understanding to inorganic chemistry especially during their self-learning hours, a massive open online course (MOOC) in inorganic chemistry has been developed in 2017. Five learning units were developed under the Inorganic Chemistry MOOC, and each learning unit contains notes, movies and quizzes as the teaching materials. The materials in the MOOC are following the course syllabus in inorganic chemistry course that we teach to the first year students under Resource Chemistry Program in Faculty of Resource Science and Technology, UNIMAS. After implementing MOOC for 2 years, the students were found to have a better understanding to inorganic chemistry by judging them using Outcome Based Education (OBE) system.

Keywords: inorganic chemistry, online learning, self-learning.

Introduction
Inorganic chemistry has been given an impression to many people that it is a tough subject to learn. As an inorganic chemistry lecturer, he/she not only needs to understand insight about the inorganic chemistry theories, but also be able to give many examples in order to enhance the understanding of the students. However, the students tend to forget the theories and explanations after the class, which could lead to low interest from students to inorganic chemistry. The initial idea of developing online learning for inorganic chemistry in UNIMAS was to enhance students’ understanding to inorganic chemistry theories especially during their self-learning hours. Since the subject is a worldwide subject, whereby all the inorganic chemistry lecturers are teaching the common theories for inorganic chemistry, thus Inorganic Chemistry MOOC was then developed. The URL of the MOOC is https://www.openlearning.com/courses/inorganic-chemistry. Under the Inorganic Chemistry MOOC, we used movies, notes as well as quizzes as the teaching materials. The print screens of the videos are shown in Fig. 1 and 2, whereas the quiz is in Fig. 3.

Fig. 1. The print screen of introduction video of Inorganic Chemistry MOOC in UNIMAS
Fig. 2. Print screen of a video in Inorganic Chemistry MOOC explaining ionic bond.

Fig. 3. Print screen of a quiz in Inorganic Chemistry MOOC.

Based on the past 2 years results after having Inorganic Chemistry MOOC, the students were found to have better course learning outcome achievements to the inorganic chemistry.

**Acknowledgement**

The authors would like to express our sincere thanks to the E-learning coordinator as well as the supporting staffs from CALM, Universiti Malaysia Sarawak, for their supports and helps in making the videos and MOOC.
ETHICS IN DIGITAL SOCIETY

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Highlights:
Use of technology is necessary to complement the traditional lecture. By having new teaching and learning style, which is supported by technology will give an opportunity to the passive students to participate virtually in the learning process. Freedom to choose their group members and topic will give more advantages to students to complete their work efficiently. Always giving an example of the learning topic, have two ways interaction and allow them to apply their skills in technology in their learning process will make them more understand the issue. All of these are important for the students to have more interest in their learning process.

Keywords: ethics, learning, technology, teaching, society.

Introduction
In the era of digital, every citizen should have the capabilities to cope with technology evolution, which is getting more advanced from time to time. Traditionally, a society guided with ethics knowledge; therefore ethics in digital society also should move in line with the advancement of the technology. In 2018, the Malaysia Computer Emergency Response Team (MyCERT) under Cyber Security Malaysia (CSM) recorded over 10,000 cybersecurity attacks on corporations and individuals nationwide (Joe, 2019). Lack of security awareness while they are online is very crucial due to the deficiency of education, awareness and professionalism training (Arachchilage & Love, 2014). Ethics on how to be an ethical internet users and able to protect themselves when they are online should be considered in as a teaching course in schools and university level.

In UNIMAS, ethics in Information Technology is an elective course offered by the Faculty of Computer Science and Information Technology to all students except FCSIT students. This course explores ethics issue related to information technology, highlighting issues and ethical use of IT as a communication medium. It also explains the risks and issues of computer misuse. It also includes an understanding of intellectual property related to the use and dissemination of information in IT. The objectives of this course are to explain the underlying concepts of both technology and ethical behaviour in IT. Then the students able to illustrate ethical and professional values and impact of the values to the community. Throughout this course, they able to analyze the problems related to ethical issues in a digital society.

eLEAP is a medium of teaching and learning of this course. It is used as a platform to provide the lecture materials, online quizzes, online mid-term examination, assignment submission and other teaching materials to the students. To enable students aware of the issue of ethic in Malaysia, the students were asked to do research on ethics real issue happens in Malaysia and present the findings.

To increase students’ awareness on ethical issue in Malaysia, one task is designed as one of the assessments. The students were asked to use their IT skills such as search online resources, creating the video, design infographic poster and present the findings. In completing this task, the student need to learn on how to create infographic posters and video of the issue. They are free to choose any animation software to design the poster and creating the video such as Canva (poster) and Powtoon (video) to explain the issue. It requires them to explore the existing design and animation software and learn the skills independently to complete their tasks. Both methods require them to learn the specific skills on how to search the relevant issue because the students can choose any current issue happened in Malaysia. By choosing their topic, they have more interest to produce the better output of their works.

According to the students, course itself it is very important to the university students. From the survey conducted after they have completed the course, all the students (100%) agreed that ethics course is beneficial to them (Table 1). This course is needed due to the increasing number of Internet threat nowadays.
Table 1: Response from the students

<table>
<thead>
<tr>
<th>Response</th>
<th>Average</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100%</td>
<td>100</td>
</tr>
<tr>
<td>No</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100</td>
</tr>
</tbody>
</table>

From the students’ work, the materials can be used to deliver a message to the community through social media. For example, issue of cyberbully can be forwarded to the school students in order to increase their awareness on the issue. The video and infographic poster of the video has commercial value for campaign purposes such as advertisement or as social service message through social media.

Acknowledgement
We would like to thank UNIMAS for providing eLEAP for teaching and learning.

References
SIMULATED ELECTRONIC HEALTH DOCUMENTATION BY NURSING STUDENTS

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Highlights: A simulated web-application for electronic health Records [EHR] with appropriate introduction given to students would motivate nursing students to navigate the application as a learning experience.

Keywords: simulated electronic health documentation; Nursing students

Introduction
EHR have been implemented in healthcare organizations in different countries including selected Malaysian hospitals. Healthcare professionals including nurses navigate EHR system in relation to patient history, nursing assessment and interventions, progress notes, vital signs, intakes-outputs, incident reports, physicians’ orders etc (Nugawela and Sahama, 2011). As a simulated, web-application, Integrated Nursing Education System (iNES) with various functional design features including system, user and module management, management of patient record, medication, patient measurement, assessment and case management has been made accessible to the Department of Nursing in UNIMAS upon MoU with the National University of Singapore (NUS), a briefing and training workshops in collaboration with NUS (Kowittawakul, 2014) were organized for the academic staff, management and students to learn to utilize the iNES prior to the actual integration into the teaching-learning activities of the academic session 2015/2016.

A total of 133 nursing students (year 2 to year 4) were recruited to be involved in the simulated EHR related activities via the iNES. An arrangement was made with the course coordinators of three identified nursing courses to be registered in the iNES (Health Assessment, Paediatric Nursing Practicum and Medical-Surgical Nursing Practicum) to provide students with the experience of EHR via the iNES by the nursing students throughout the one whole semester as part of their teaching-learning activities.

Context of the Innovation
A simulated EHR web application, the iNES has been developed by the National University of Singapore (NUS) (Kowittawakul, 2014). Realizing that University Malaysia Sarawak (UNIMAS) has yet to develop its own simulated, web application for EHR, an effort was made for the signing of memorandum of academic understanding between the Vice Chancellor of UNIMAS and NUS for it to be made accessible to the Nursing students.

Importance to Education
Providing nursing students the experience with EHR would be very beneficial toward preparation as future health professionals. The adoption of EHRS would help to improve access to clinical information and patient data, improve inter-professional integration, patient safety, increase health care quality and reduce the health care costs (Bate, 2010). Nurses navigate electronic health record system in relation to patient history, nursing assessment and interventions, progress notes, vital signs, intakes-outputs, incident reports, physicians’ orders etc (Nugawela and Sahama, 2011). A large number of incidents occurred due to EHR system interface issues and improper inputs. The use of advance technology such as EHRS cannot improve health care outcome if it is not accepted and utilized efficiently by health professionals such as nurses as users (Nugawela and Sahama (2011).
Advantages
Preparation of nursing students as the future professional nurses who would accept and utilize the EHRS proficiently for a safe delivery of healthcare practice is imperative. Nurses’ attitude towards EHR system at their workplace could be influenced negatively by their lack of experience with the system as students (Gajanayake and Sahama, 2013). Those who are prepared with prior clinical placement exposure and experience to simulation EHRS adapted more quickly to the real clinical environment, indicated higher clinical performance ability and confidence to cope with the use of EHR at their workplace (Bowers, et al, 2011; Gardner and Jones, 2012; Gajanayake and Sahama, 2013).

In the local academic setting, students’ practice for documenting simulated patients’ health history, health assessment, nursing progress notes, nursing interventions, vital signs or intakes-outputs are prominently paper-based. I envisioned that the integration of a simulated, functional EHR application for students to navigate, document and plan patient care in a simulated format as part of the teaching-learning activities would be beneficial to the nursing students in the nursing program.

Commercial Potentials
Early exposure for students on potential benefits and impacts of EHRS over traditional paper records and potentially safer patient care would positively influence students’ acceptance and appreciation of the technology in their future professional nursing practice. Educational institutions would do well to introduce simulated EHRS as one of the teaching-learning activities. University management’s support and allocation of resources to develop a local, user-friendly, meaningful simulated educational web application would help to contribute towards developing students’ confidence for their future role in safer healthcare provision.

Figure 1: Sample page of the iNES for simulated electronic health documentation:


Acknowledgement
We are grateful for the National University of Singapore for allowing the access to the INES for the academic purpose.

References
AIWAH: AN INTEGRATED INTERACTIVE APPROACH TO BUILD THE INTEGRATED PERSONALITY OF SECONDARY SCHOOL STUDENTS ACADEMICALLY, SPIRITUALLY AND PHYSICALLY

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Kolej Genius Insan usim

Highlights
This integrative education innovation is based as a virtual school idea aimed at two primary goals. The first is to build an integrated personality of secondary school students, from the academic, spiritual and physical side through an interactive curriculum. Students record their academic, social and sports activities through a system that has been prepared for this purpose, they get points for all activities they did to encourage them to correct in daily life habits. The second is to provide an open educational materials prepared by the researchers and experts as interactive educational curricula for students and teachers and distribute it among school students as supporting materials for school study in arabic, english, quran, sunnah and mathematics. Each module has certificate for each course that ends. This innovation also provides learning materials selected from open source and available for use, benefiting students. This innovation allow student also to perform learning engagement through peer collaboration and sharing knowledge and interest by joined or even create group among their friends.

Keywords: interactive approach, integrated personality, secondary school students

Originality of idea/disruptive innovation, uniqueness, novelty,
Inventiveness in this innovation is the integration of the spiritual, physical and academic personality of the student, that the students are self-monitoring themselves. This innovation is unique in providing academic content and explain it, where students conduct free self-study, and if a specific explanation is needed, they discuss with their friends and if they need extra explanation they can call the teachers. In terms of novelty, this innovation is the marking system for students on the daily activities, healthy habits like shower, brushing the teeth and social activity such as cleaning the cemetery, visiting orphanages and finally religious activities in general. In this innovation, the student records all the activities that he did and he can choose the academic subjects he wants to study at his will and looks for the teacher who is expected to help him. This innovation provides academic content for both teachers and students. It also solves the problem of students who cannot pay for extra classes by providing academic content that is available all the time and free for all students and teachers. This educational content can be used by all devices, laptops, computers, or smart tablets.

Commercialization
This innovation from the beginning was for community service, which is not contrary to the commercial principle. At the beginning of this innovation project will be free for the purpose of introducing the community to this innovation and spread in the educational community and in the next stage will have this innovation fees and advantage available to students because the academic principle more important from the principle commercial.

Status of innovation
This innovation is now in its final stage as it has been completed and now it is in the stage of verifying that all steps have been taken as planned and then the innovation will be used as a pilot study, to make sure students interact with it and then evaluate it in a practical way, after the feedback the researchers will do the necessary adjustment. In this innovation, the researchers develop an interactive curriculum aimed for secondary school students to prepare an integrated personality. The attraction element in this innovation is the integration of this approach combines the academic, physical, spiritual and social aspects through a marking system and encourage.

Academic Value
The researchers conducted research on this innovation to develop and upgrade this product. There are two research papers that have been published and there are two papers to be publish soon.
FLIPPED CLASSROOM AND DIGITAL TOOLS. WHAT? HOW?

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Highlights: Computer-supported collaborative learning (CSCL) is a pedagogical approach where learning takes place via social interaction using a computer or through the Internet. CSCL can be implemented online, classroom learning environments and can take place synchronously or asynchronously. CSCL will be integrated in the lesson together with digital tools.

Keywords: flipped classroom, digital tools, engage, pupils

Introduction
Technology is literally everywhere and the kids adapt to it faster than anyone else. Unlike teachers, pupils are being raised in digital world. Therefore, digital tools in classroom are becoming more crucial. Traditional methods had been overcome by digital methods. Thus, teachers need to be more advance than pupils in this digital world. One of innovative digital tool for classroom is Blendspace. Blendspace is a platform to create digital lessons. I am using this tool to engage and attract pupils’ interest in learning English. My school is in rural area where the Internet and phone coverage are limited. Normally teaching and learning happen like the traditional ways but for new curriculum CEFR, we need to add on suitable tools such as speaker to play the song. Pupils are more engage and show their interest using new tools on teaching and learning. Blendspace provides a variety of benefits to me both personally and professionally. It can use to flip classroom. In this presentation, Blendspace is use to attract and engage pupils’ interest. In this tool, I prepare the questions and integrate suitable video from Youtube for pupils to listen to and learn. It makes my lessons run smoothly. In order to use this tool, there are several limitations occurs (to overcome). Therefore, for the sake of our pupils’ we as a teacher need to enhance our professional practice so that we can cope in this digital future.
PEMBELAJARAN MUDAH ALIH (MOBILE LEARNING-SPEEDLINE) DAN GAMIFIKASI DAPAT MENINGKATKAN KEMAHIRAN MENGIRA OPERASI TAMBAH & TOLAK TERHADAP MURID PENDIDIKAN KHAS HINGGA ANGKA JUTA

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ABSTRAK
Kajian ini dilaksanakan adalah untuk meningkatkan kemahiran mengira operasi tambah dan tolak hingga angka juta dengan mudah dan cepat melalui pembelajaran mudah alih iaitu (Mobile Learning-SPEEDLINE) terhadap murid penkidikan khas.

Kata Kunci: Mobile Learning - SPEEDLINE, Kaedah SPEEDLINE, Operasi Tambah & Tolak, Murid Pendidikan Khas.

Pengenalan

Kaedah SPEEDLINE
Tercetusnya idea untuk mencipta kaedah baru dalam penyelidikan ini iaitu (Mobile-Learning-SPEEDLINE) adalah berdasarkan kesukaran murid dalam mengira dan menguasai operasi tambah dan tolak yang melibatkan nombor yang banyak dan nilai digit yang besar. Tetapi memandangkan murid Pendidikan Khas mempunyai masalah pada kecerdasan otak mereka tidak mampu untuk mengira dan mencongak dengan menggunakan cara yang normal. Tetapi mereka juga mempunyai tahap kognitif yang rendah dan pada kebiasaannya tidak mampu untuk mencapai tahap KBAT. Hal ini menunjukkan mereka tidak mampu untuk mengira dan mencongak dengan menggunakan cara yang normal.

Operasi Tambah: menggunakan nombor 0 hingga 9 secara menaik dan berulang. Jika sekiranya terdapat nombor 0, murid hendaklah memberikan 1 garisan tambahan disebelah.

Operasi Tolak: menggunakan nombor 9 hingga 0 secara menurun dan berulang. Jika sekiranya terdapat nombor 0, murid hendaklah memberikan 1 garisan tambahan disebelah.

Langkah 1

| 6 | 2 | 7 | 4 | 1 | 3 | 5 |

4 2 7 3 1 5

6 2 7 4 1 3 5

+ 3 6 2 4 1 3 5

= 3 6 2 4 1 3 5

TEKNIK GARISAN (SPEEDLINE)
MOBILE LEARNING - SPEEDLINE:

M-Pembelajaran boleh ditafsirkan sebagai satu corak e-pembelajaran yang menyampaikan kandungan Pendidikan dan bahan bahan sokongan pembelajaran melalui alat komunikasi tanpa wayar seperti telefon bimbit pintar, iPad, iPod, Tablet PC dan Alat bantuan Digital Peribadi (PDA) yang digunakan oleh murid dan guru di dalam kelas. M-pembelajaran kini mendapat sambutan hangat dalam kalangan Penyelidik di institusi Pendidikan melalui kajian kajian berkanaan M-pembelajaran. Oleh demikian para pendidik perlulah mengambil peluang untuk menggunakan pelbagai aplikasi Android percuma yang mudah didapati dan mudah diakses sebagai persediaan untuk menyokong pengajaran mereka. Aplikasi android boleh meningkatkan minat dan motivasi murid Pendidikan khas dan mempengaruhi murid untuk terlibat secara langsung dalam proses pembelajaran.
Kesimpulan dan Penambahbaikan
Kaedah SpeedLine ini telah membuka minda pengkaji pada satu lagi aspek yang perlu diambil berat iaitu penambahbaikan cara pembelajaran yang mana pengkaji perlu berusaha untuk mempelbagaikan lagi kaedah pengajaran dan pembelajaran yang lebih menyenonokkan iaitu PdPc ke arah Revolusi Industri 4.0 Mobile Game 3D SPEEDLINE untuk pada masa akan datang berfokuskan pada gabungan Pembelajaran Abad Ke-21 dan IR 4.0 yang akan dapat menarik minat murid terhadap mata pelajaran matematik seterusnya membolehkan murid menggunakan ilmu pengiraan ini dalam kehidupan mereka.

Pengakuan
Penyelidikan ini dijalankan oleh Pervasive Computing & Educational Technology Research Group, C-ACT, Universiti Teknikal Malaysia Melaka (UTeM), dan Kementerian Pendidikan Malaysia.

Rujukan
INTERACTIVE LEARNING APPROACH (ILA)

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Highlights: Interactive learning Approach (ILA), a gamification methodology been used in Orientation Program in 2019. Role-Playing Game (RPG) gamification concept allows the students to develop freely by solving tasks designed according to story-line modified from Lemur Empire. During the program, students will transform and role-play as members of tribe who awakens from long sleep after the flood washed over the land of Lemur. They were task to collect in-game currency, called Bank of Innovative Learning (BIL) in the process of achieving total development. Questionnaire used to identify the effects the program based on Choice Theory Reality Therapy (CTRT).

Keywords: interactive, gamification, Lemur, role-play, development, CTRT

Introduction
Day in, day out, we always heard that teachers and parents are complaining about issues related to students don’t like to go to school. Even after doing review on countless opinion from people who involved directly or indirectly in education. Willingham (2009) failed to give an answer for the question posed by his own book titled “Why Don’t Students Like School?” However, he did suggest that students don’t like school because their teachers don’t have a full understanding of certain cognitive principles and therefore don’t teach as well as they could. In other words, the teachers are too focus on the contents or syllabus set earlier, without take in account about how students mind are working during the process.

Content
In conjunction with the Choice Theory Reality Therapy, ILA intends to introduce the concept of gamification. The participants will attend the 9-days program as players of a real time – Role Play Game (RPG). Throughout the event, participants need to know their role as separate individual, as well as a member of a group (Tribe). Participants will be task to collect in-game currency (Bank of Innovative learning - BIL), so that they can proceed to challenge higher rank of tasks designed. Non-Playable Character (NPC) design using free sources software provides more information to participants during the program.

Children explore and play freely, in ways designed to learn about the physical and social world in which they are developing. In school, they are told they must stop following their interests and, instead, do just what teachers are telling them they must do. That is why they don’t like school (Gray, 2015). Glessier (1965) agreed with the statement and outlined five basic needs for humans, include freedom, fun, survival, power and love and belonging. If researchers and educators care enough to put more efforts to understand more about the children needs, is not hard to see that children actually can be provided with tools for learning, including access to a wide range of other people from whom they can learn, learn what they need to know—and much more—through their own self-directed play and exploration. ILA had been designed carefully based on Glessier Choice Theory to make sure students enjoy their study in class.

Statistics show the number of those who do not continue to finish their secondary school in Malaysia is 14,396 or three per cent of the population (Chan, 2017). Research by Roslan (2017) reveals that the biggest factor that contributes to dropout rates is the inability of students to cope with the syllabus being taught. Roslan (2017) also stress that one of the reason of students’ dropout is non-other than lack of interest in their study. If educator can give children a good grasp of basic literacy and numeracy skills early in life, they will be less likely to drop out of school. To do so, educator can plan methods which can bring more fun and engage more students and teachers. Some students already know the material before the lesson starts by teachers and they can’t wait to move ahead. Rigid time table and fixed lectures make them yawn during the lesson or creating problems in class. Because of this, a more fun method had been design so that students have power to decide their direction in their study and enjoy the achievement individually or as a group.

The Interactive Learning Approach is an innovation which improve communication among peers, educators and materials. To solve tasks designed, students will encounter problems which require them to use all 21st Century Skill they had learnt. Besides, the students will also be prepared earlier for life after school by sharpening their survival skills guided by teachers using this methodology. By this, hoping that the students will enjoy school more. Hence, the dropout rate among students will decrease.

This methodology is still in the process of improving after two years of implementation in the school. First, to achieve this goal the joining other in Industry Revolution 4.0, IoT and other intelligent technology elements will be added in. Then, the concept of Oyako, which mean family bond in Japanese will be join into the program. This methodology is still in the process of improving after two years of implementation in the school. First, to achieve this goal to joining other in Industry Revolution 4.0, IoT and other intelligent technology elements will be added in. Then, the concept of Oyako, which mean family bond in Japanese will be join into the program. This can be achieved by designing tasks or reports through apps which become a communication tools for parties involved.
The result in the table below shows that satisfaction of students who have participated in Interactive Learning Program in SMK St Columba in early 2019.

Table 1: Satisfaction of new students on activities run during Orientation Program 2019 based on five basic needs of William Glesser Choice Theory Reality Therapy

<table>
<thead>
<tr>
<th>Needs</th>
<th>Traditional Approach</th>
<th>Interactive Learning Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fun</td>
<td>2.81</td>
<td>3.76</td>
</tr>
<tr>
<td>Love and Belonging</td>
<td>2.72</td>
<td>4.11</td>
</tr>
<tr>
<td>Power</td>
<td>2.87</td>
<td>3.48</td>
</tr>
<tr>
<td>Freedom</td>
<td>2.82</td>
<td>3.66</td>
</tr>
<tr>
<td>Survival</td>
<td>1.89</td>
<td>3.89</td>
</tr>
<tr>
<td>Overall</td>
<td>2.83</td>
<td>3.77</td>
</tr>
</tbody>
</table>

Acknowledgement
I am grateful for school management of SMK St Columba to allow me to carry out the program as planned.

References
Peter Gray (2015). Free to Learn: why unleashing the instinct to play while make our children happier, more self-reliant, and better students for life
EXPLORING EFFECTS OF CONSTRUCTIONISM ON LEARNING BASIC SCIENTIFIC PROCESSING SKILLS

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Highlights:
This exploratory study on Constructionism was done to explore how project, passion, peer and play facilitate learning of basic Scientific Processing Skills (SPS) for three poor performing students at a semi-rural National School in Kota Samarahan, Sarawak. The constructionist learning environment gave the students an opportunity to express their ideas using digital media called Scratch, a block-based programming software developed by Mitchel Resnick and his team of researchers in Lifelong Kindergarten, Massachusetts Institute of Technology (“Scratch - Imagine, Program, Share,” n.d.). The study showed that the creation of digital animation on Scratch to concretize the students’ ideas managed to boost the practice of SPS and improved engagement among them. The research showed that SPS were employed in and for the making of their digital animation. The act of collaboratively creating using technology instead of consuming it improved and affected the learning of SPS and engagement. The study’s constructionist approach of learning epitomised Science, Technology, Engineering and Mathematics (STEM) learning environment for 21st century learning in Malaysia’s primary school.

Keywords: constructionism, scientific processing skills (SPS), Scratch, STEM

Introduction
The pursuit of creating an artifact to exhibit an idea requires the idea to be broken down into smaller pieces and be constructed back into whole again, much like playing Lego. This process of building will require the learner to go through an iterative process of breaking down their understanding and organizing it by fabricating an artifact. The students in the study had difficulty forming abstract thoughts and needed help in learning SPS. The study explored how producing a digital animation as an artifact facilitated the learning of SPS and effected their engagement. This constructionist approach of learning differs with the prevalent instructionist approach being used in most classroom across Malaysia. This design of learning environment takes advantage of simple technology which are easily accessible and used by educators for various functions. This study experimented to see whether the constructionist learning design that adopted simple technology was feasible to be conducted in a school located in a semi-rural surrounding.

Background of design
Children between the ages ten till eleven years old might have difficulty in learning basic SPS as they are at the early stages of developing abstract thinking (Piaget, 1952). The learning of these SPS is vital for the acquisition of knowledge through inquiry. The realization of the students’ cognitive challenge in acquiring SPS called for a different learning approach. The study proposed to introduce a basic programming software named Scratch into the teaching and learning of basic SPS among three poor performing students in a Science classroom. The Ministry of Education enacted a policy to integrate technology across the curriculum but guidelines to implement the policy are preliminary for educators to adopt. Since there is a gap between enacted policy and implementation, the study was necessary to address the issue.

Importance and significance
The study explored the importance of project, passion, peer and play in engaging students to learn. This learning approach design exploited simple coding skills through the Scratch programme to allow students to practice SPS as they hatched out their ideas into visible, concrete artifacts to proudly showcase their vision. Constructionism learning provides freedom for the learner to be creative, to problem solve as they debug their programming and to practice all the SPS which are observing, inferring, measuring, communicating, classifying and predicting. This study’s learning environment personalizes learning for each student as they are the forefront runners in making their own animations. Driven by motivation to complete their own project, the impact on engagement can be visibly seen in the students measured using Leuven Involvement Scale for Young Children (Bertram & Pascal, 2002). Furthermore, this design of learning environment afforded teacher and students focused interaction, peer to peer learning and a stage for
students to joyfully present their work to others. Not only can unique ideas be shared but ideas can be further developed as feedback was given.

**Advantages towards education and community**

This study strengthens the importance of STEM education in generating higher order thinking skills to prepare the current generation to meet challenges ahead. The constructionist learning design epitomises STEM education in developing abstract thinking skills which were required throughout the constructing process. In learning how to stack code pallets together using the basic programming software, Scratch, students practiced simple computational thinking while they playfully tinkered with their animation to perfect it. It is evidently shown through this study that the advantages of building an animation using Scratch not only benefits the learning of SPS, engagement but also encourages computational thinking to create their project.

**Commercial values and future works**

This study could inform other educators on the tried and tested strategies used in carrying out a constructionist learning approach. These strategies could be compiled into a blueprint for other educators in Malaysia, to be used as a guideline for adopting this learning design in their own classroom. Future work that could be carried out are integrating the constructionist learning approach with other curriculums, providing more examples on how to realize the goal of Malaysia’s Education policy of integrating technology across the curriculum.

**References**


INVESTIGATING COLLABORATIVE INTERACTIONS WITHIN BIOLOGY PROJECT-BASED LEARNING DISCUSSIONS IN VIRTUAL CHAT GROUPS

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Highlights:
The teacher’s innovation is using virtual chat group to increase the collaborative interactions of students and teacher, in order to assist the students in completing their project in project-based learning. This innovation is evaluated by investigate the content and types of interactions of the students and teacher in the post-class group in the project-based learning by categorical encoding conversation analysis. Next, find out the usefulness of the post-class interactions in assisting the groups of students to complete their project through interviewing 19 participants.

Keywords: collaborative learning, virtual chat group, project-based learning, post-class group

Introduction
Nowadays, world is going forward digitalized. We are inseparable with digital elements that associated with internet or WiFi every day. For instance, we use smart phone for communication, smart television to watch Youtube channel, and other electronic devices such as printer, home security CCTV with alarm, that connected to internet or WiFi to function. The importance of using digital elements is not only confined in our daily life, but also inspires some educators to create innovation that applicable in teaching and learning.

Impact of Innovation
As we know, a good project group work needs quality collaboration. From the teacher’s experiences, limited collaboration may restrict the students’ creativity and affect the teamwork efforts in a project. Therefore, the teacher is using virtual chat group (WhatsApp groups) as her innovation to increase the collaboration among students and teacher in project-based learning. The use of virtual chat group is found to be convenient and common for educators to assist the students after formal school time as students nowadays are readily exposed to mobile technologies every day. In this teaching innovation, teacher had formed WhatsApp groups with students and tried to extend their collaboration to after formal school time. This also extend the time the teacher spend with students, and easier for teacher to monitor the students’ progression from time to time toward completion of their project. Students also can be assisted whenever they need help anytime, anywhere due to their engagement in the WhatsApp groups. The investigation on the content and types of interactions of the students and teacher in the post-class groups by categorical encoding conversation analysis: interview with 19 participants are two methods used to evaluate this teaching innovation. This innovation is important to education as our education system has to synchronize with the technology. Teacher and students’ are no longer restricted to face to face interactions, but incorporation of the digital tools in teacher and students’ interactions is necessary. This innovation in teaching had the advantages for teacher to monitor students’ project progression, while it is a communication tools to increase the collaboration among teacher and students which necessitate project group work. With this teaching innovation, it may give the basic idea for developing of better future commercialized communication platform for education purpose.

Acknowledgement
First of all, I would like to express my heartfelt gratitude to my lecturer, Mr. Chua Kee Man for his diligence and meticulous help, guidance, precious feedback and suggestions, encouragement and support throughout the teaching innovation study. Also I am grateful to all students whose names are not mentioned here for your voluntarism and willingness to contribute some of your experiences and precious time to involve in this teaching innovation. Special thanks to my supportive family and friends, for their valuable suggestions in improving the teaching innovation study and continuous encouragement throughout this hard time. It has been a long, trying and intense road to achieve this accomplishment. I really appreciate contributions from all of you, thank you all.

References


IF YOU CAN TALK, YOU CAN WRITE

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Highlights: “If You Can Talk, You Can Write” is a must have in the case of SPM candidates and English language teachers’ How To recipe per se. Students narrate story in the realm of everyday activity, interest and encounter, prompted by Wt-Questions. Students are assisted by a writing template in the form of fan deck. When it is flipped open, the fan deck forms into model of a pizza. There are six divisional triangles simulating the structure of narrative genre. The secret recipe is revealed only in my edublog.

Keywords: traditional classroom edublog, narrative writing, pizza pizzie fan deck.

Introduction
Over decades, Malaysia Secondary Certificate in English Language paper maintains its ever-green features. Candidates are required to perform writing proficiency in a 2-hour plus exam. Sadly, many candidates attempt to hit higher band in Section B by trial and error. On a larger scale, this paper contributes 54.84% to the final score of English language paper. According to Malaysia Education Blueprint 2013-2025, only 28% of students achieve at least a Credit benchmarked to Cambridge 1119 in English language SPM. That is less than one third of students sitting for SPM. Next, based on a survey by the EF English Proficiency Index (EF EPI), Malaysia dropped to 22nd place from 13th (2017) in English proficiency ranking for non-native English speakers. Apparently, there is a mis-link between the large investment made by Ministry of Education and actual ESL classroom practice. In the real classroom, my students would narrate a story with every detail they do and feel, fashioned by big words. One other group would memorize model story and call it theirs. Hence, it lacks interest, originality and authenticity.

My conviction affirms “If You Can Talk, You Can Write”. With great concern, I managed to create a tool to help improve writing skill. My project idea is based on the model of pizza. In this module, the writing steps are designed according to the six divisions of the pizza. The first horizontal cut, then the left and right diagonals cut. That divides into six smaller triangular shapes, simulating a wedge part of the pizza. Then, I tap into the six pieces to flow my writing ideas into bite-size writing toolkit, Pizza Pizzie Fan Deck. It is made of 6 distinct colour palettes that are carefully designed to fit into classroom writing style. It comes in a sturdy outer case, easier than ever to use in class and elsewhere. It is also ergonomically designed with round edges. I have video recorded an introduction of this tool. Users could find it in szejin.edublogs.org alongside video, instruction, pictures and notes.

Since the quality of the education system cannot exceed the quality of its teachers, the only way to improve the outcomes is to improve instruction. This teaching module is the important evolution in education to make writing effective and relevant. It is the bridge to connect students to the writing task and to college writing assignment hereafter. The stronghold of this project is the 4 Pillars of Partnership. To enjoy a long lasting, strong and sustainable classroom writing, the said four essential pillars namely, education system, school’s support, teacher’s skills and student’s readiness must not be denied. The System and School’s Support are beyond teacher’s control. The only responsibility which is also the utmost is the technical skills teachers seek to develop gradually. Hence, this tool justifies its existence. It provides proven and practical steps in teaching students to narrate a good story to meet the writing criteria.

Certainly, it has high commercial value to meet the market need. It is also a stepping stone to higher writing competency in students’ tertiary education. Unfortunately, many secondary school students are not equipped with this mindset for higher learning. Undoubtedly, the best learning apps fails when the internet frails. Sarawak has more than a thousand schools in rural area. These schools do not enjoy stable and sustainable internet service. Therefore, this is a great advantage to switch to my writing tool for most rural areas. First reason, time efficiency. That toolkit shows the proven steps and thus minimises unwanted errors. Users could exceed the edublogs again when internet reconnects. Once students have started well, it opens the floodgate and pours the ideas into a structured piece. Second, holistic language usage. The writing template invites students to use variety of word class; adverb, adjective, collective noun, idioms, proverbs, figurative expression and so on. They are systematically structured at every part of the story. Students will be at awe of how many language aspects they have used in a writing activity. Third, sense of achievement. As the rate of completion is guaranteed, students are trained to begin with the end in mind. As the beginning is crafted, students are trained to correlate ideas to the ending. In between, there are conflict and climax element to guide them through aided by the prompting WT-questions. In estimation, a writing cycle could be completed within 50 minutes. The remaining 10 minutes for editing and proofreading. Throughout the process, my edublog enables users to drop comments, suggestions and upload pictures and testimony.

What is not available in the market, here is the answer. For the thousand schools in the rural part of Sarawak, this tool shades light while encourages collaboration via fun learning activity in traditional classroom with e-learning.
Eventually with essential writing skill, high school students will find smooth transition to tertiary education and workplace thereafter.

Figure 1: Pizza Pizzie Fan Deck

Table 1: Distribution of Paragraphings in the Writing Template

<table>
<thead>
<tr>
<th>Paragraphs</th>
<th>Word Class/Language Used/Expressions</th>
<th>The Effect</th>
<th>Minutes Spent (Suggested Time: 1 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre &amp; Post Test</td>
<td></td>
<td>Pre &amp; Post Test</td>
</tr>
<tr>
<td>1 Introduction</td>
<td>WH-Questions, Sensory Touch</td>
<td>Set the background</td>
<td>15 m</td>
</tr>
<tr>
<td>2 Rising Action</td>
<td>The subject matter Adjective, Adverb</td>
<td>Create subject matter</td>
<td>15 m</td>
</tr>
<tr>
<td>3 Conflict-Cause</td>
<td>Proverbs, Idioms, Similes, Twin Words</td>
<td>Create problem</td>
<td>NIL</td>
</tr>
<tr>
<td>4 Conflict-Effect</td>
<td>Direct Speech</td>
<td>Dwell in the consequence</td>
<td>NIL</td>
</tr>
<tr>
<td>5 Climax</td>
<td>Sentence Types, Sense of Finality</td>
<td>Unexpected hero saves the day</td>
<td>15 m</td>
</tr>
<tr>
<td>6 Resolution</td>
<td>Wrap up, Lesson Learnt</td>
<td>Related to Sensory Touch</td>
<td>15 m</td>
</tr>
</tbody>
</table>

\[\text{(60 m)} \quad \text{(48 m)}\]

References
GREEN BOX

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Highlights: It has been known for decades that mercury pollution causes serious harm to human health and the environment. Until recently, governments have resisted many of the control measures needed to minimize mercury pollution. Mercury pollution cause by 2 main reason:
- Intentional source
- Unintentional source

Our focus to intentional source, intentional source classify into 8 types:
- Medical
- Switches
- Batteries
- Florescent lamp
- Mercury containing lamp
- Measuring devices
- Dental amalgams
- Pesticides and biocides

My innovation is to overcome one intentional source which is burnt florescent bulb either (CFL) compact florescent light or (FL) florescent light

Keywords: transformer, florescent, mercury, burnt, pollution, reuse, wirelessly

Introduction
A device with simple transformer can light up burnt florescent lights in the presence of mercury vapour and other materials especially phosphor (chemical formula Ca[(P, PO₄)₃+(F, Cl)₂]Sb³⁺, Mn²⁺) coating in florescent bulb. This concept basically reduces the cost for disposal and recycle of florescent bulb. It also reduces air pollution cause by mercury vapour. This wireless energy of resonant transformer used to REUSE BURNT florescent lights. A simple casing for resonant transformer can be used to light up 2 to 4 compact florescent light (CFL) or 1 to 2 florescent light (FL) wirelessly. The oscillating electric field generated by a resonant transformer, excites the gas commonly mercury vapour inside the fluorescent light, which excites the fluorescent material especially phosphor coating to produce visible light. Mechanism of exciting gas molecules inside a fluorescent bulb by a resonant transformer is similar to the mechanism behind the normal operation of the fluorescent light: it is a strong electric field, which ionizes gases.

Content
According to my innovation the normal operation system in florescent light replace by a simple resonant transformer to reuse burnt bulb wirelessly. This innovation only needs a simple 9v or 18v input resonant transformer set up in a casing without any input wires to the bulb. Burnt florescent lights will glow immediately without wire connection. The casing can be change according to the burnt florescent light sizes, types and shapes. The common way of transferring electric energy is by using cables and wires. However, this conventional way is insufficient and messy. The use of electronic appliances increases the use of cables which creates the complicated connection in daily life. The solution for this problem is wireless energy transfer. Air is the only media to transfer the energy. The case in which interconnecting wires are complicated and unmanageable wireless electricity is beneficial. An air core resonant transformer which generates high frequency, high voltage, and low alternating current. It is efficient and safe when operated carefully.

The setup can be use 9v battery for portable device or use 18volt power supply using power supply adapter. This wireless energy can be used for all kink of florescent lights with presence of mercury vapour and phosphor in it. In schools the device can be use in two clubs such as STEM club and environment or nature club as part of the yearly program to reuse burnt florescent bulb. This project will educate students a wise method to overcome mercury pollution. Resonant transformer is also can be used as an example of a step-up transformer for Form 3 students in science labs to attract attention and also as induction set before teach transformer related topic.

Advantage of this innovation as follows:
- Wireless
• Low voltage device
• Reuse burnt florescent lights
• Reduce pollution

The brightness produce by the lights in this device is 500 to 600 LUX whereas the new florescent bulb will produce 950 to 1050 LUX. So this device perfect for use as table lamb or as a dim light in house. This device is definitely the easiest and effective solution to overcome the pollution issue due to mercury waste (waste code by DOE: SW 109). The current method of recycling burnt florescent bulb is not effective in most of the countries all over the world. Mass production of this innovation will cost less than RM25 per device. It would be a great solution by reuse then recycle florescent bulb.

Acknowledgement
To my mom, dad, family and beloved friends for their untiring support and forgiveness.
To my spiritual master and Almighty God, for his guidance and love that shown to fulfill this study
To my school SMK St Teresa students and teachers.

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THE USE OF ROBOTICS IN LEARNING OF BLOOD CIRCULATORY SYSTEM OF HUMAN

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Highlights:
This module was designed to encourage student involve more effectively in learning process and take part in the hands-on activities to help them improving their understanding in the blood circulatory system in human. This module introduce the use of robots to show the pathway of blood circulation in heart, student will be more concentrate and their attention levels will be increase as this hands-on fun and interactively activity requires them to use all their senses. As the world nowadays are looking forward for a fully-fledged artificial intelligence and digital integration is the fundamental element in 21st century education. This module also aims to prepare students to be more prepared for technological changes in the future.

Keywords: robotics, hands-on learning, technologies, transportation, 21st century education, fun learning

Introduction
Ministry of Education Malaysia launched Science Technology Engineering Mathematics (STEM) education initiative in Malaysia Education Blueprint 2013 – 2025 (PPPM 2013-2025). The aim of STEM education initiative is to prepare students with the skill to meet the science and technology challenges and to ensure Malaysia has sufficient number of qualified STEM graduates. The concept of STEM is defined from three perspectives: STEM field, STEM stream and STEM approach (MOE, 2016). STEM approach refers to teaching and learning strategy that involving the application of knowledge, skills and values of Science, Technology, Engineering, and Mathematics, in an integrated manner to solve problems in the context of life daily, community and environment (MOE, 2016).

The theory of multiple intelligence was developed in 1983 by Dr. Howard Gardner, professor of education at Harvard University. It suggests that the traditional notion of intelligence, based on I.Q. testing, is far too limited. Instead, Dr. Gardner proposes eight different intelligence to account for a broader range of human potential in children and adults. Dr. Gardner says that our schools and culture focus most of their attention on linguistic and logical-mathematical intelligence. We esteem the highly articulate or logical people of our culture. However, Dr. Gardner says that we should also place equal attention on individuals who show gifts in the other intelligence.

Education in the 21st century highlights globalization and internationalization. Teachers in the 21st century are technology savvy. To effectively engage and teach 2 generation students, teachers will help the educational system meet this requirement (Helen B. Boholano, 2017). The students in the 21st century have grown up in a fast paced digital world, and easily tune out of the traditional lecture-based classroom. 21st century learners must possess both self-direction and an ability to collaborate with individuals, groups, and machines (McCoog, 2008).

Robots are slowly being incorporated in our society and beginning a process of seamless integration in everyday lives both at home and at school. This impact of social robotics is even more crucial for children and teenagers, where robots can be used for their development and intellectual growth. Based on a review of the application of robots in education by Omar Mubin, C. Stevens, Suleman Shahid, Abdul Al Mahmud and JD. Jian, robots can be an entertaining platform to learn science and it has shown that young children performed better in examination.

The main purpose of this module by using robots to help teacher to encourage student involve in this STEM Education Initiative and enhanced student understanding in science subject especially in blood circulatory system in human. The hands-on learning approach is about providing students with opportunities to experiment with their surroundings as a form of problem solving through robotic. It is about creativity and collaboration, motivation and self-direction. It is about improvisation and discovery, and playful learning experiences with real-world relevance.

Content
This robot is use during the evaluation process during teaching and learning process. It is programmed to detect the flow of the blood circulations in heart. Students will coding the robot and control the robot’s movement based on the circuit printed. Student tend to get confuse about the flow of oxygenated and deoxygenated blood in a blood circulation. Some of the students have different intelligence which required teacher to use different method to explain.

• To encourage student involve in this STEM Education Initiative and enhanced student understanding in science subject especially in blood circulatory system in human.

• To prepare students to be more prepared for technological changes in the future. To introduce simple coding of robot as a future language.

Acknowledgement
DeTAR Putra, Universiti Malaysia Sarawak
We are grateful for The Sekolah Menengah Sains Kuching Utara’s Robotic Club for helping us in providing the robot used for the research.

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Learning \( \frac{dy}{dx} \) Using Differentiation Intelligent Tutoring System (DifITS)

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felixchuo@gmail.com

**Highlights:** In Malaysia, students start learning derivative \( \frac{dy}{dx} \) at the age of 16 years old through Additional Mathematics. Students found difficulties in learning and acquiring the skills for finding \( \frac{dy}{dx} \) in questions given. Differentiation Intelligent Tutoring System (DifITS) was developed to provide What You See Is What You Get (WYSIWYG) approach in learning \( \frac{dy}{dx} \). DifITS is an intelligent e-learning system as it can recognize students working through their handwriting when answering \( \frac{dy}{dx} \) questions. Therefore, even though students are using the e-learning system (DifITS), the experience is much like what they would be doing using pen and paper.

**Key words:** \( \frac{dy}{dx} \) derivative, differentiation, intelligent tutoring system, WYSIWYG

**Introduction**

Differentiation \( \frac{dy}{dx} \) or derivative is an important area in Mathematics that students will need in order to further their studies to higher level of education. Many areas of studies such as engineering and business require the skills and knowledge of doing differentiation \( \frac{dy}{dx} \) in the area of Calculus. Difficulties in understanding and acquiring the skills for finding \( \frac{dy}{dx} \) has hampered a lot of students' progress in learning Calculus and their studies too.

**Innovation**

Differentiation Intelligent Tutoring System (DifITS) is an e-learning system that was developed based on the idea of Intelligent Tutoring System (ITS) where the students will be provided with one to one approach tutoring much like a real-life tutor. DifITS provides the learning contents on the six basic formulae of finding \( \frac{dy}{dx} \) follows by practices and ends with evaluation on each of the formula. DifITS provides hints and guides to help the students practice the six basic formulae of \( \frac{dy}{dx} \). Students can use their handwriting during practices and evaluation when using DifITS just as if they are working using pen and paper. Thus, DifITS provides What You See Is What You Get (WYSIWYG) approach in the learning process. This enables the ease of transfer of the skills learnt using e-learning system to paper.

**Learning Theories**

DifITS was developed based on scaffolding learning theory and mastery learning theory. Scaffolding drew upon Vygotsky’s ZPD (Zone of Proximal Development) which implied that learners could achieve tasks that were outside of their current ability if given appropriate help (Reiser & Tabak, 2014). Hints and guides are available in DifITS during practices and evaluation stages for students who would need them. Thus, students can build on their knowledge of learning the formulae of finding \( \frac{dy}{dx} \) by using those hints and guides.

As for mastery learning, students can only proceed to the next formula when DifITS evaluates and finds that they have mastered the learning of the current formula. If the students have not mastered the current formula, they will be required to repeat learning the content and practice of the current formula. They will then be re-evaluated. In other words, only students who have mastered each of the current formula can proceed to the learning of the next formula. Therefore, DifITS ensures that every student will master each of the six basic formulae for finding \( \frac{dy}{dx} \) after using it for learning.

**E-learning elements of DifITS**

DifITS was developed based on the principles of effective e-learning (Mayer, 2005, Sorden, 2012) that include:

- The multimedia principle: adding graphics to words can improve learning.
- The contiguity principle: placing text near graphics improves learning.
- The modality principle: explaining graphics with audio improves learning.
- The redundancy principle: explaining graphics with audio and redundant text can hurt learning.
- The coherence principle: using gratuitous visuals, text, and sounds can hurt learning.

DifITS was developed using Django version 1.8.3 together with Python 64 bits version 2.7.10 programming language together with SQLite personal for database. Hypertext Markup Language (HTML) was used to code the page to be displayed on the web browser. Cascading Style Sheets (CSS) was used to format the layout of the web page such as font size, font shadow, font colour, background colour and images. JavaScript and Asynchronous JavaScript and XML (Ajax) were also used to make the system more interactive and responsive.
Skill 4. The first derivative of a product of two polynomials

There are 5 questions for practice in this exercise section. The aim of this exercise section is to help you practice the skill you have learnt in the tutorial section. You can find more information on how to use the work below. This practice is contaminated text.

Question 5. Differentiate with respect to $x$ for

$$y = (1 - 3x^2)(x^2 - 4x + 5)$$

Step 1: $y' = 1 - 3x^2$
Step 2: $x^2 - 4x + 5$ (for $x$)

Good effort! Way to go!

$$\frac{dy}{dx} = -6x$$

$$\frac{du}{dx} = -6x$$

Figure 1: The ability of DifITS in recognizing and evaluating the working in handwriting form.

Motivation

DifITS provides a self-paced learning approach in learning $\frac{dy}{dx}$. Students learn and master the six basic formulae of $\frac{dy}{dx}$ by themselves. They learn at their own pace thus giving them motivation and satisfaction in the learning process.

Table 1 shows the result of the evaluation of DifITS using Instructional Materials Motivation Survey (IMMS) (Keller, 2009), Perceived Usefulness (PU) and Perceived Ease of Use (PEU) (Davis, 1989).

Table 1: Mean value and standard deviation for PU, PEU and IMMS (Cronbach’s Alpha > 0.7).

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness (PU)</td>
<td>1.9778</td>
<td>0.93619</td>
</tr>
<tr>
<td>Perceived Ease of Use (PEU)</td>
<td>2.3444</td>
<td>0.86020</td>
</tr>
<tr>
<td>Instructional Materials Motivation Survey (IMMS)</td>
<td>3.4514</td>
<td>0.49092</td>
</tr>
</tbody>
</table>

Acknowledgement

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References
