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eLCC 2019 UTeM

INTERNATIONAL e-LEARNING CARNIVAL & CONFERENCE

2019 INTERNATIONAL e-LEARNING CARNIVAL & CONFERENCE

CONFERENCE PROCEEDINGS

26th June 2019, UTeM, Melaka

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Proceedings of the 1st International e-Learning Carnival & Conference 2019 Universiti Teknikal Malaysia Melaka

26th June 2019, UTeM, Melaka

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WELCOMING MESSAGE BY **CHAIR**

Assalamualaikum wrt. wbt. and Good Day.

Alhamdulillah.

2019 International Carnival & Conference on e-Learning UTeM (eLCC2019) acts as a platform to promote, explore and share best practices and global expertise in e-learning application at higher learning institutions. The events and activities include competitions, exhibition and conference. The focus of eLCC2019 is on showcasing best practices, innovations, researches and products in e-Learning. eLCC2019 received 71 local & international participants in the categories of Virtual & Augmented Reality, Gamification, Blended Learning, Flipped Learning, Massive Open Online Course (MOOC), e-Assessment, Intelligent Tutoring System (ITS), Virtual Learning Environment (VLE), Learning Management System (LMS), Personalized Learning Environment (PLE), e-Portfolios, Learning Analytic, Global Classroom and Mobile Apps. The eLCC2019 conference is held at Universiti Teknikal Malaysia Melaka on 26th June 2019.

The eLCC2019 was organized by Centre for Instructional Resources & Technology (PSTP), Universiti Teknikal Malaysia Melaka, in collaboration with MIEPTA (Majlis Ketua-Ketua Penyelaras e-Pembelajaran IPTA Malaysia), Pervasive Computing & Educational Tools (PET) Research Group, and sponsors.

On behalf of the organizing committee, I would like to take this opportunity to express our gratitude to all who have worked hard and hence contributed to the success of this event.

Thanks also to the Advisory Committee and last but not least to all the working committee members. Without their tireless effort, hard work and commitment, this event would not be possible.

Professor Ts. Dr. Sazilah Salam
eLCC2019 Chair,
Universiti Teknikal Malaysia Melaka (UTeM)

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Database Management Curriculum Visualization using Gamification Path Design

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Keywords: database management, gamification path, database curriculum

ABSTRACT – Gamification becomes an interest among researchers and academicians as it allows student to enjoy the learning world. However, in most gamification learning subjects, the gamification path design was upon the subject. In this study, we proposed a prototype education system simulating on database management curriculum to visualize the connection and continuity of core subjects in this course using gamification path design. In order to visualize the connection and continuity of this database management curriculum, similarities and differences among the topics of each core subjects were identified. In addition, our proposed prototype allows the learning management process such as managing the lecturers, students, resource materials, assessment and tracking performance. Students who have finished successfully on the core subjects with the status as level 1 were then allowed to enroll the core subjects of the next level. We believe this approach may help student to learn with high motivation as they are able to see the connection and continuity of this course.

1. INTRODUCTION

The existing database in each system or application nowadays is very important in handling business operation. Therefore, in most universities, database has become a fundamental subject. In Universiti Teknikal Malaysia Melaka (UTeM), Faculty of Information and Communication Technology (FTMK) offer the Database Management courses in such that it contains variety of database subjects.

In conducting these subjects in teaching and learning, there were lots of education tools and application being used among students. Kahoot[1], Testmoz[2], and Learning Management System (LMS)[3,4] were some example of education tools that allows student to enjoy while learning. More tools for teaching and learning purposes can be referred in Education 4.0 [5]. Nevertheless, these education tools were designed for learning or assessing students' understanding on a certain topic of subjects . As a result, student still had difficulty in visualizing the course that they took in a big picture. Thus, most of the students just learn for passing marks and did not see the continuity in each subject.

In current trend, gamification has become a new approach in learning. The gamification [6]–[10] benefits of implementing gamification were so enjoyable, yet allows social sharing, user engagement, and performance feedback in order to improve students behaviour and motivation in learning.

For example, in study by [9], students pointed out that e-learning not only provided novel opportunities for learning, but also engaged them in an enjoyable experiences, assisting in the study of botanical knowledge. When finding the learning targets or earning rewards, students were excited and felt involved in the interesting insect hunting games.

Even though most of research related to gamification examines the impact gamified elements have on the students, there are some research related to the design of gamified courses. Ke (2009) in [11] suggests that student learning outcomes depend on a course design in which learning purposes, learner characteristics, and game design all align with one another. As educators, the need to analyze various game elements available on several factors such as: the course learning objectives, the culture of the course, the culture of the program and the individual needs of students.

In addition, De Schutter and Abeele (2014) in [11], highlighted that it is labor intensive to gamify courses, and they offer suggestions for those interested in gamifying their courses, suggesting that the instructor needs to provide extra structure for students. Due to the increased complexity that the game elements may present, instructors need to ensure that students are adequately informed of the rules in which the rules of the game should be clearly stated in the syllabus, and the instructor needs to ensure that students read the syllabus and are aware of the game elements.

Meanwhile, [11] highlighted on game elements and examples of practical application, in which can be referred by any gamification researchers. One of the game element that we would like to relate with our proposed in this study is level. According to [11], levels represent reaching a certain milestone or achievement. Many times players are able to quickly 'level up' at the beginning of the game, but as they progress it becomes harder and harder to level up. This goes along with challenge and flow. It's a good idea to have some low hanging fruit to reward participants for early achievements. Thus, by applying level in this proposed

system, we hope that this makes student may feel good and want to progress. Nevertheless, in our proposed system, we enhanced the level of gamification by involving the core subjects for computer science students in FTMK, majoring in Database Management as a big picture in order to allow students to visualize the curriculum of their course.

2. SYSTEM FRAMEWORK

In this section, we display the system framework design of our proposed prototype illustrated as the use case considering the scenarios and users who will be involved in this system. Refer Figure 1.

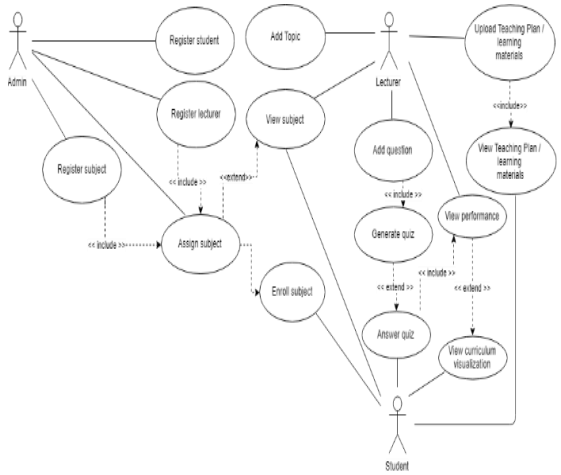

Figure 1: Use Case for Database Management Curriculum Visualization

Figure 1 illustrates the use case that contain in our proposed prototype. There are 3 actor or user that involves in this system which are the administrator, the lecturer and the student. By default, every actor must log in into the system. The administrator (henceforth admin) handle the jobs first, such as register students, lecturers and subjects. Then the admin needs to assign the lecturer for certain subjects. Students were then allowed to enroll subjects offered by the faculty.

The lecturers were then allowed to view and manage the assigned subjects by uploading teaching plan and learning materials such as videos, lecture notes in format pdf, images or audio. These teaching plan and learning materials can be viewed by the students. As a part of teaching and learning, lecturers will add topics and questions to allow students to answer quizzes. The performance of students answering quizzes can be see by students and lecturers.

The interesting part of our prototype is that students can view their progress level according topics in the subject that they have enroll. Only if quizzes of all topics for the enrolled subjects are passed, then the student will have the privilege to enroll for the next subject. This information allows student to visualize the curriculum of Database Management to be seen in a big picture, in which our prototype are also allowing students to see the similarity and continuity of the core subjects of this course.

3. CONCLUSION

This study presents the prototype of Database Management Curriculum Visualization. Despite the importance of learning, we believe another great motivation for students to learn is to see the big picture of the course that they took. It will add more value as student could see the similarity and continuity of each subjects taken in their course of study.

4. ACKNOWLEGEMENT

This research is conducted by Optimas Research Group, C-ACT, Universiti Teknikal Malaysia Melaka (UTeM), and supported by Ministry of Science, Technology & Innovation FRGS grant: FRGS/1/2015/ICT02/FTMK-CACT/F00286.

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An Interactive Web-Based Learning Environment for Computer Aided Design (CAD) Modeling in Engineering Education

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Keywords: Virtual Learning Environment, Computer Aided Design, engineering education

ABSTRACT – Application of virtual learning environment (VLE) in teaching enhances students' learning experience by utilizing computer-aided tools and accessibility to internet connection. In this semester, we have applied the VLE approach for an 8-hour Computer Aided Design (CAD) workshop to coach a large batch of 107 students of varying backgrounds to attain the SolidWorks Associates certification. The constrain of the workshop execution included the limited instructional time in the lab due the high lab usage for other courses offered in the running semester. Therefore, a virtual and interactive web-based learning environment was developed to support the CAD teaching session while enhances the students' experience regardless of their ability of keep-up with the in-laboratory instructions. The virtual environment provided instructional videos to enable the students to study and assess their designs at their own pace. Furthermore, online assignment submission and evaluation effectively increased the productivity of respective instructors during the assessment process. Advanced design modeling was successfully attained for a very limited in-class session. Feedbacks collected from participants suggested that the workshop supported by the VLE is an exciting and value-added learning experience.

1. INTRODUCTION

The Computer Aided Design (CAD) course in engineering education involves the use of various computer software to develop 2-dimensional (2D) and 3-dimensional (3D) part modeling, part assembly, and computational simulation. Among the CAD tools available includes SolidWorks, AutoCAD, and CATIA. Currently, the CAD-based course at Fakulti Kejuruteraan Pembuatan (FKP), Universiti Teknikal Malaysia Melaka (UTeM) was accomplished through lab-based lectures and demonstrations, followed by lab activities which allowed the students to explore the usage of CAD tools from the workstations provided in the lab.

Recently, the faculty received an offer from a CAD training company to get 100 students for Certified SolidWorks Associates (CSWA). To encourage students' participation, the faculty was required to train and assess the readiness of potential candidates through special SolidWorks workshop. However, the challenge when organizing a workshop during a running semester includes limited computer lab available as the higher priority would be to cater to existing courses. Furthermore, such situation may not be conducive to train a high number of participants.

A previous study has suggested that personalized learning through the integration of Web 2.0 is able to support and improve the teaching and learning experience [1]. In particular, the development of a Virtual Learning Environment (VLE) platform in engineering education suggested that students are able to achieve the learning objectives similar to the in-class setting [2]. The greatest advantage of the VLE is the learner's flexibility to use the system at their preferred time in their preferred environment within their preferred pace. The VLE approach breaks the barrier to in-class learning by providing adequate teaching materials in a platform accessible with an internet connection. Such teaching materials may be in the form of text-based or interactive-based media. However, the use of interactive media such as instructional video does not necessarily improve task completion as it can also be accomplished within a traditional setting as well [3]. Nonetheless, the transition from a traditional setting to a more interactive environment is highly encouraged for CAD-based engineering education to keep up with increasing demand for design integration and technical complexities [4].

In this paper, we developed a VLE platform to support the CAD-based modeling workshop using SolidWorks. The content of the platform was designed to embed related teaching materials including technical drawings, instructional videos, and assignments to support a very limited face-to-face contact hour. Students attainment and feedback was collected to measure their perception with the new learning environment.

2. METHODOLOGY

Samples; The workshop was advertised to all FKP students, and the responses received from 107 students of various batch with the highest participation from 3rd year batch (50 students), followed by the 4th year batch (38 students), 2nd year batch (13 students), 1st year batch (5 students) and 1 postgraduate student.

Content Development; The teaching module of the workshop consists of 4 lessons including Beginner

Modeling, Intermediate Modeling, Advanced Modeling and Parts Assembly using SolidWorks features. Although some students have prior CAD experience, the content of the workshop was designed assuming all participants are novice users of the CAD tool. Technical drawings with instructional videos were prepared for all sessions with four units for Beginner Modeling session, three units for Intermediate Modeling session, five units for Advanced

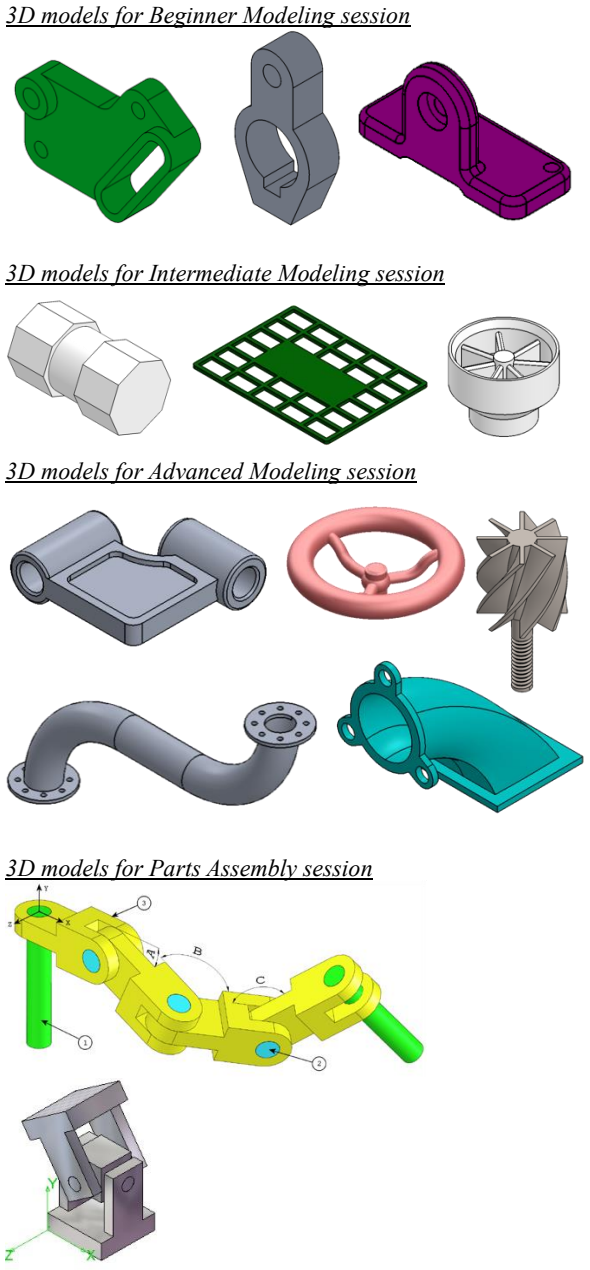


Figure 1: 3D models for training sessions

Modeling session, and two units for Parts Assembly session (Figure 1). For Beginner Modeling, participants were introduced to the SolidWorks interfaces followed by basic sketching (line, circle, trim) and modeling (extrude boss, extrude cut, fillet) features. For Intermediate Modeling, a different technique of modeling using revolved boss was introduced. Furthermore, additional features using pattern and mirror were included to increase modeling efficiencies. For Advanced Modeling, advanced features including designing with equation parameters and creating irregular profiles with sweep, loft, and boundary boss features were included. A website was developed at http://bit.ly/SWWorkshop2019 as a platform of VLE for the students. The navigation network of the website is illustrated in Figure 2.

Implementation; Due to the limited workstations per laboratories with the high usage of laboratories because of the running semester, the workshop was conducted for five slots per week which facilitates students ranging from 20 to 25 participants for each slot. Contact hour with the appointed instructors will only be held for 2 hours. As the competency of using the CAD tools relies heavily on the practice of using various CAD features, assignments were assigned to all

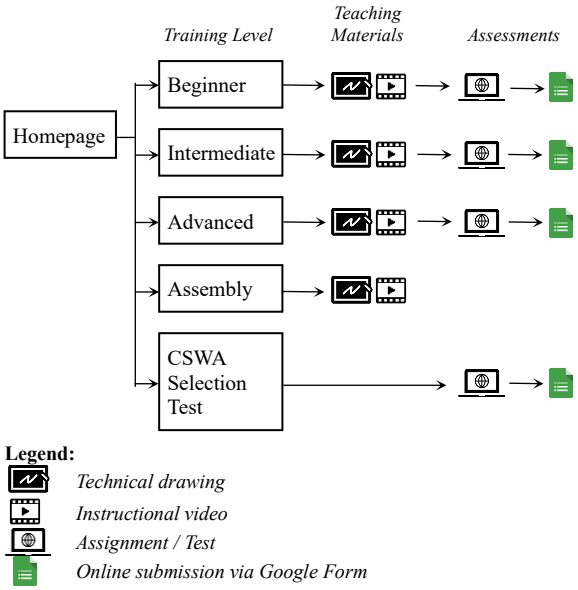
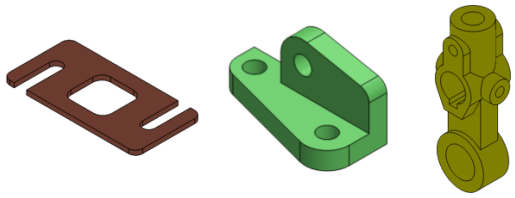


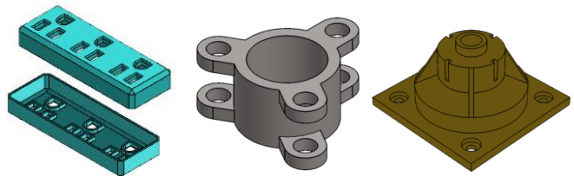
Figure 2: Navigation network of the website

participants to ensure commitment and continuous usage of the CAD tools. Participants were required to submit their work through the Google Drive Form before the next training session. Instructional videos of the models assigned were uploaded into the website only after the deadline of the assignment submission.

Beginner Level Assignments



Intermediate Level Assignments



Advanced Level Assignments

Figure 3: 3D modeling assignments

Instruments; Assignments which measured students' competency in using the SolidWorks software were developed for beginner, intermediate and advanced level (Figure 3). Participants who are interested to get certified shall undertake the CSWA Candidate Selection Test which measured students' readiness and competencies in 3D modeling and parts assembly. Marks was accumulated from assignments (30%) and test (70%). Accuracy of the developed CAD parts was assessed based on the attained mass. All assignments and test were submitted online via Google Drive by which all responses were stored in an Excel-based worksheet. Submitted answers can be automatically scored by applying certain formulation function in the worksheet.

Data Collection Procedure; Assessments was directly measured from the online submission. In addition, participants' feedback on their experience of using the CAD tools was also collected during assignment submission.

3. RESULTS AND DISCUSSION

Students experience of using CAD tools prior to the workshop was measured and the highest competency was recorded for AutoCAD (95 students) followed by CATIA (55 students) and SolidWorks (48 students) (Figure 4). Figure 5 shows the virtual learning platform of the SolidWorks workshop, which navigates to the respective workshop session. At the page of each workshop session, the resources for technical drawing, assignments and assignment submission was made available with supporting instructional videos.

Figure 6 shows the achievement for all participants following assignments given after each training session. As expected, the number of students committed to the workshop – which was measured based on the submitted assignments reduced as the difficulty level of the CAD usage increases. 62% of the participants attained high score for beginner level training, while the excellent attainment decreases as the training progress with increased difficulty, by which 35% attained high score for intermediate level, and only 3% attained high score for advanced level.

Feedbacks collected from all participants after the beginner level workshop suggested that although the CAD lessons are challenging, yet it is fun and interesting to learn. Some of the participants felt content when they manage to complete the assignments. Furthermore, they commented that the provided instructional video is very helpful especially when they could not keep up with the lessons in the classroom.

For the intermediate level workshop, one of the assignments given requires the students to develop a rib structure from an oriented plane. Students are required to outsource their CAD skills as it is not as straight-forward as the beginner-level modeling. At this stage, participants

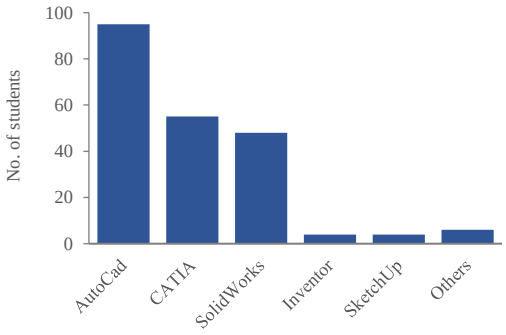


Figure 4: Participants' competency of using CAD tools.

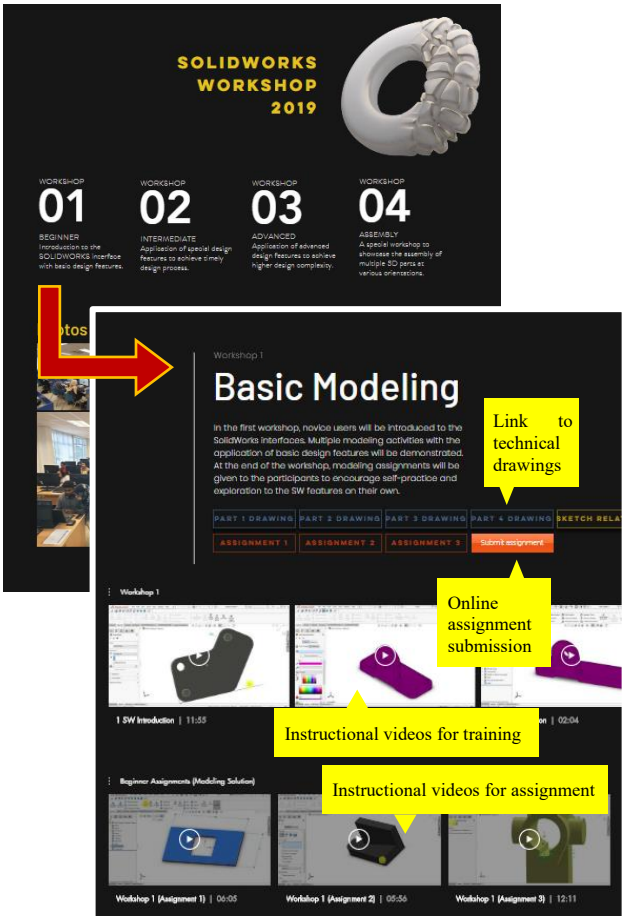


Figure 5: The developed VLE platform for the SolidWorks Workshop.

commented that it is harder for them to accomplish the given tasks compared to the previous workshop. Nonetheless, some manage to opt to viable resources online in completing their task.

As the workshop progresses to advance CAD features, participants commented on its increased difficulty level. Some participants commented on the need to have a longer contact hour with the instructors to attain a better understanding of using the advanced CAD features. The number of responses received at this level reduced drastically and it may correlate with students' confidence in getting the right answer for the submitted work. Furthermore, the timeline of the advanced training

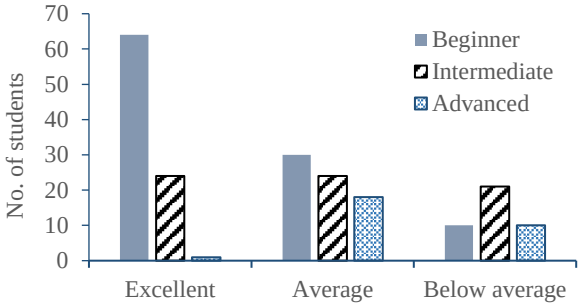


Figure 6: Participants' score following assignment for each session.

session fell in the middle of the teaching semester (between week 8 to 10), which is a critical period of mid-term exam, mid-term break, assignments and national event holiday. As the workshop is not a compulsory course, hence, less prioritization was being put in submitting the CAD assignment.

Generally, the appointed contact hours (2-hours per session) is very limited and not adequate for effective teaching and learning the CAD tools. For some session, only one-part modeling could be demonstrated and guided. However, such inadequacy was managed through the development of the VLE platform. The platform allows all teaching material to be accessed and the instructional videos to be viewed at the students' preferred environment provided that they have adequate internet connectivity. The VLE enhances the students' learning experience in the context of learning materials accessibility. Furthermore, as the high number of participants registered for the workshop, one-to-one guided coaching may not be adequate especially in a very limited face-to-face session. Hence, the provided instructional videos supported students' guidance and allow the participants to follow the in-class instructions at their own pace which encourage effective teaching and learning activity.

The VLE also enhances the assessment process. Online submission allowed the instructors to track the students' progress, and certain formulation applied to the Excel-based data allow an automatic scoring system. Such advantage reduces the hassle during marking and allows speedy grading.

Furthermore, the VLE allows effective feedback collection from all participants. Such feedback was attained from an open-ended question which inquires the participants' experience in the provided lessons.

Although the use of VLE was perceived to have a positive impact to teaching and learning, nonetheless the challenge in building the VLE platform includes the time needed to prepare the VLE contents, especially the instructional videos. Effective planning and adequate preparation were necessary to ensure all materials were in place prior to the workshop. Furthermore, the web-navigational network and platform must be decided to ensure good user-experience when navigating through the website.

In addition, building the website itself requires prior knowledge of web development. Enhancing the web including navigation style, icon placements, and color coordination requires creative skills which may not be as straight-forward in most technical subjects. The VLE approach requires an instructor with adequate training and competency level in building the platform.

Although the VLE was found to be very effective in supporting in-class teaching and learning, nonetheless there were certain variables which could not be controlled, including students' motivation and discipline to commit to the workshop right to the end. As the workshop was not a compulsory course, it affected the student's learning time in fulfilling the assignments with the current courses enrolled in the running semester. Nonetheless, the use of the VLE platform was considered as a positive achievement as it enables the instructors to guide and coach students for a mere 8-contact-hour. For a very limited time, the students were guided in using various CAD features ranging from basic to advanced CAD level. Students' commitment to the given assignments was expected to attain better success with the VLE implementation.

4. CONCLUSION

This study presents the development of the VLE platform for a CAD modeling workshop in engineering education. Students' attainments were measured and the feedback of the VLE platform was collected. Assessments suggested that students scored highest in the earlier workshops, and significantly reduces as the difficulty level increases. The VLE platform supported the learning experience in a very limited timeframe for a high number of students. Furthermore, the efficiency of the assessment process was increased with the VLE platform. Feedbacks suggested that the provided materials supported the learning experience in their preferred environment and pace. However, the challenge in developing the VLE includes the extra time required for additional material preparation, instructor's competency in web-page development, and uncontrolled variables including students' motivation and commitment. If participants' commitment is not an issue, then it is perceived that the VLE would be a great support to the teaching and learning experience.

5. ACKNOWLEDGEMENT

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Analysis of Student Acceptance Using Immersive Technology: Office Layout VR Tour

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Keywords: Virtual Reality, Immersive Technology, Student Acceptance, Office Layout

ABSTRACT – Virtual Reality (VR) content development in education offers an exciting and effective process of learning as it is provided a deep understanding of the material and environment by the learner with the use of Mobile Virtual Reality (Mobile VR). However, there are still problems and challenges in learning process that includes the usage and no VR content. This paper analyses students' intention to use immersive technology that is virtual reality; as a new learning approach on office concept layout tour.

1. INTRODUCTION

[1] The technology's constant evolution is taking education to new ways which are much more attractive to the students, making the use of new tools possible, taking the teaching process to an evolution. In this evolution, the Virtual Reality takes an important place.

VR is one of techniques to build creative educational tools; whereby its provides sophisticated types of communication via three-dimensional software settings that can increase the motivation of learners in class.[1]

The VR (guided exploration) it is a learning mode using the advanced teaching atmosphere based on VR. This teaching atmosphere offers extra navigational support in the form of a tracer which offers a real-time display of the location of the simulated object on a map and directional arrows.[2]

[3] Users can use VR goggles to visually shield the true world and thus become visually embedded in the setting of virtual reality.

There are many benefits of using VR in education. Some of the advantages includes provides a more engaging teaching atmosphere, utilizing interactivity and interactive learning, broad area of application and engage various senses.[4]

2. PROBLEM STATEMENT

Despite all the benefits and advantages using the tools, students are failed to describe office layout in the real workplace based on theory and figures as in reference material. Moreover, the printed materials offer less attractive experience for students. There is no virtual reality as a tool in teaching and learning office layout. Consequently, the level of understanding is low that lead to low student performance.

In this paper, we analyse students' intention using VR as one of learning approach for one of the topics in *Office Administration* course, namely; Office Concept Layout.

3. METHODOLOGY

Samples; The study was conducted based on a total of 274 students from 9 classes. The sample are the students from Diploma in Secretarial Sciences, Politeknik Sultan Idris Shah. It also includes Semester 1 students who undertaking DPK1023: Office Administration 1.

Design & Development; The videos and images in this VR used the 360° media that put a great way to enhance the view of office layout area. The Unity development environment was used for the mobile VR application development for its key VR features such as user input, controller support and rendering. Using VR visual: smartphone was connected to PC and using Google Daydream to run the office layout tour. The equipment includes remote controller and google daydream.

Implementation; Students were briefly explained on how to experience Office Layout VR Tour using smartphone. Unity apps were used on smartphone that available from Appstore or Google Play. Students were guided based on the menu appear on the screen. The menu selection showed the different office layout concept. The online survey was distributed after the VR Tour session ended.

Instrument; The authors used questionnaire as instrument of the study. Online survey was created using Google Form. It consisted of several part that includes demographic background, perceived ease of use, perceived usefulness, perceived enjoyment, intention to use and attitude using VR. The respondents rated each open-ended statement on a 5-point Likert scale, with 1 being strongly disagree and 5 being strongly agree. Only in attitude using different conditions for the statement.

Data Collection Procedure: Data collection was conducted for one week. The link of online survey distributed to all students from 9 WhatsApp group that represent all classes represented for this study. A total of

108 responses were received and validated.

4. RESULT AND DISCUSSION

All respondents in this study were within 18-21 years and have access to internet. Additionally, Table 1 and Table 2 shows additional information on demographic. Table 1 illustrate the smartphone platform of the respondents. In this study, all respondents were using smartphone with 62.96% of them using Android platform while the rest using iOS. In this study, the connected smartphone that can accessed VR is 100%. Thus, all students have adequate equipment to experience VR tour using individual gadget owned by them.

Table 1: Smartphone platform

Platform	No. of Students	%
iOS	40	37.04
Android	68	62.96
∑	108	100

Table 2 displayed the smartphone usage for e-learning by the respondents. Most respondents are very often and always use smartphone for e-learning with 67.59%. Only 3.70% of respondents never use their smartphone for e-learning. The smartphone usage for e-learning should be 100% because VR concept in this case are using connected smartphone.

Table 2: Smartphone usage for e-learning

	No. of Students	%
Never	4	3.70
Rarely	5	4.63
Sometimes	26	24.07
Very Often	41	37.96
Always	32	29.63
∑	108	100

Based on Table 3, the highest rating from respondent was they believe it would be easy to get VR to do what they want to do, with mean score of 4.06 (SD=.82). Generally, in this construct, respondent perceived VR was easily to use with the mean score above 4.00.

Table 3: Perceived ease of use

	Mean	Std. Deviation
I believe using VR would be easy for me.	4.02	.80
I believe it would be easy to get VR to do what I want it to do.	4.06	.82
I believe using VR would be clear and understandable.	4.05	.80
I would find VR flexible to interact with	4.02	.84
It would be easy for me to become skillful at using VR	4.04	.77

In term of perceived enjoyment (Table 4), the respondent agreed using VR would be enjoyable (mean = 4.12, SD = .84). It is found that using VR are enjoyable as the mean score above 4.00 in all items.

Table 4: Perceived enjoyment

	Mean	Std. Deviation
I believe I would find using VR enjoyable.	4.07	.89
I believe I would have fun using VR	4.07	.83
Using VR would be exciting.	4.11	.84
Using VR would be enjoyable	4.12	.84

The respondent's intent to use VR within the foreseeable future with mean = 3.84 (SD=.83) based on Table 5. It suggests the students will use VR for their learning processes. Chung *et al*, [5] claimed Mobile learning will become the technology education milestone.

Table 5: Intention to use

	Mean	Std. Deviation
There is a high likelihood that I will use VR within the foreseeable future.	3.90	.85
I intend to use VR within the foreseeable future.	3.91	.83
I will use VR within the foreseeable future.	3.87	.82
Using VR in the foreseeable future is important to me.	3.84	.90

Table 6 explains the perceived usefulness of the respondents. All items were rated with minimum of mean score of 4.00. The highest mean score of 4.05 (SD=.86) is the respondents believe using VR would help them to be more effective. Therefore, students perceived usage of VR as one of the useful tools in their education.

Table 6: Perceived usefulness

	Mean	Std. Deviation
I believe using VR would help me be more productive.	4.03	.84
I believe using VR would help me be more effective.	4.05	.86
Using VR would be useful in my education.	4.00	.90
Using VR would improve my education.	4.01	.88

Using VR would enhance my effectiveness in education.	4.00	.89

Table 7 showed the construct of students' attitude toward using VR. Generally, respondents' attitude toward using VR are in high level that is; leading to a positive attitude. The mean score for all items is above 4.00. The highest score with mean = 4.11, SD=.66 is satisfactory level.

Table 7: Attitude toward using VR

	Mean	Std. Deviation
Attitude Bad-Good	4.07	.65
Attitude Negative-Positive	4.06	.69
Attitude Unsatisfactory-Satisfactory	4.11	.66
Attitude Unfavorable-Favorable	4.08	.67
Attitude Unpleasant-Pleasant	4.06	.70

5. CONCLUSION

This study offered the findings on student acceptance using VR of Office Concept Layout. Students are more satisfied, enjoyable, VR is useful and would use it in the future. We would suggest future study will further analyze into larger sample and looking on student performance.

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The Design and Development of CSBake for Autistic Learners in Secondary School

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Keywords: CSBake, Autism, assistive tool, mobile apps

ABSTRACT – Bakery subject has been introduced into autistics students in some special education unit in secondary schools. However, there is a lack of technology intervention in the current teaching and learning process for bakery subject. CSBake developed as an assistive tool in a form of mobile apps for autistic students to assist on teaching and learning bakery subject. CSBake provides details on how to make a sausage bun. The target user for this apps is secondary student with mid to high functioning Autism. This paper provides the design and development on CSBake to assist the Autistic students in learning bakery subject.

1. INTRODUCTION

Autism is a neurodevelopmental condition which characterised by the difficulties regarding to social communication and interactions [1]. It is also conceptualized as a behavioural syndrome of multiple neurological injuries associated with a wide variety of medical conditions.

Students with learning disabilities, including Autism, will most often require assistive technology such as software or application that could assists with reading, language, organization skills and processing information [2]. Assistive technology is a technology in a presence of products, systems, and equipment which main focus is to enhance working, learning, and daily living for individual with disabilities [3].

In the present, schools are following the curriculum given by the ministry of education, including the subjects which focus on vocational skills for special needs student. There are six main areas of expertise for Special Integration Education Program or *Program Pendidikan Khas Integrasi* (PPKI) to be chosen from, which are: (i) Stitching / Apparel / Design, (ii) Gardening / Landscaping / Nursery, (iii) Carpentry / Furniture Manufacturing, (iv) Aquaculture / Recreation Animal, (v) Cooking / Preparation / Food Catering, and (vi) Launder / Linen Attendant [4]. However, most of special education teachers are agreed that cooking / preparation/ food catering is the most needed in the curriculum, bakery subject is included in this area.

Current teaching and learning in secondary school under special education unit is mainly conducted in convenient way. Teachers act as knowledge-source in the class with direct information transfer manually. There is only minimum technology intervention in the classroom, both for students and teachers.

This paper focused on the design and development of CSBake as a tool for assisting Autistic students learning bakery subject in secondary school.

2. CSBake

CSBake is a courseware in a form of mobile apps which developed for autistic students. The courseware contains the detail of instructions for baking a sausage bun. The main purpose of CSBake as an assistive tool is to help smoothen up the teaching and learning process for bakery subject.

Mobile app is chosen as the form of the system with Android as the platform. The touchscreen interface is attractive, easy to use even for the ones who have weak fine motor skills [5]. CSBake make use the best of the flexibility and the advanced capabilities of mobile technology for assistive tool.

CSBake used ADDIE model for the design and development of the system with Gagne's Nine Event as the instructional design. Detail of the process is described below.

3. DESIGN AND DEVELOPMENT OF CSBake

ADDIE model is used as the methodology to develop CSBake. This five-phase systematic model, namely Analysis, Design, Development, Implementation and Evaluation [6], is used to guide through the process of creating multimedia products for a variety of settings. This paper focused on the first three phases of the model in the development of CSBake: (i) Analysis, (ii) Design, (iii) Development.

In Analysis phase, there are three main things to be focused on: needs analysis, participants analysis, and content analysis. Needs analysis defines the things needed by the participants, such as suitable teaching and learning style, best medium to use in teaching and learning process, things or items needed in the classroom. Participant analysis helps to define the scope of participants. The participants for CSBake are focused on:

- Special education teachers
- Mid to high functioning Autistic students
- Form 2 to Form 5 Autistic students

Content analysis defines things needed in the system, such as bakery subject materials, tasks needed to be done, step-by-step instruction for learning how to bake.

Design phase describes the process of designing the prototype. Three things to be focused on in this phase for CSBake: (i) learning objectives, (ii) instructional strategy, and (iii) evaluation strategy. Learning objectives for CSBake focused on the bigger picture of the whole syllabus of bakery subject for Special Integration Education Program or *Program Pendidikan Khas Integrasi* (PPKI). CSBake provides the instructions and steps for baking a sausage bun which is one of the recipes used for special needs student practical assessment in SMK Bukit Katil under special education unit.

Instructional strategy used for CSBake is Gagne's Nine Events [7]. Gagne's Nine Events provides series of systematic instructions focused on condition of learning in order to get the effective teaching and learning process. Each step described as below:

1. Gain the attention of the learners

Get the attention from the audience is the first important step to make. There are various ways to get attention from audience such as attractive image, video, interface, or any interactive multimedia elements.

2. Inform learners of the objectives

The objective of the whole learning process needs to be explained to the learners in order to inform them what information or knowledge they are going to receive. This could prepare the learners to organize their thoughts before receiving new information or knowledge.

3. Stimulate recall of prior learning

Help the learners to recall the previous information or knowledge and relate it to the new one. One of a way to do this is by asking questions about their past experience.

4. Present the content

Content presentation could be done in various ways, it relies on the instruments and techniques used. Utilize variety of methods could increase the effectiveness of content deliverance such as combination of multimedia elements in one medium.

5. Provide learning guidance

Guidance is important to help learners keep on track in the learning process. Provide guided activities in the session would increase the efficiency of learning process, learners would be more directed, avoid frustration towards new knowledge to be learned.

6. Elicit performance (practice)

Give opportunities for learners to apply knowledge that they have learned such as assignment and group activities.

7. Provide feedback

Feedback from teacher or instructor to the learners could give ideas of the understanding level of each learner, identify their weakness and strength, improve their performance. Detailed feedback could be given through assignments and discussions.

8. Assess performance

Allow learners to indicate content areas that they have not mastered. The evaluation could be done through written assignments, exams, quizzes, project, etc.

9. Enhance retention and transfer to the job

Help learners to apply information to personal contexts. The learners must always be aware of how they can apply what they have learned once they finished their learning.

Evaluation strategy focused on how to evaluate the effectiveness and performance of the whole teaching and learning process. As it is mentioned in the Gagne's Nine Events, the evaluation could be done in various ways. For CSBake, the evaluation is in a form of quiz as the last module in the system.

Once the design phase done, it is followed by development phase. In development phase, there are three things to focus on: (i) content development, (ii) storyboard development, and (iii) courseware development. Content development focus on the materials which needed to be put in the system. CSBake contents are divided into three: ingredients, utensils, and recipe. Ingredients are the list of items needed in making sausage bun such as bread flour, margarine, yeast, etc. Utensils are the list of tools used in making sausage bun such as mixer, oven, etc. Recipe consist the measurements of every ingredients, steps of how to make sausage bun.

Storyboard development is important step in the development phase. The storyboard acts as a blueprint of the whole system and it will be followed by the developer in the system development. This step provides the description of how the system will be. The form, platform, device, interface, and multimedia elements all are chosen in this phase.

Courseware development starts once the storyboard is done. CSBake as a mobile app is developed using Unreal Engine, focus on the android platform. There are four modules in the CSBake: Ingredients, Utensils, Recipe, and Quiz.

4. CONCLUSION

CSBake is a courseware developed specifically for bakery subject with the target user of autistic students in secondary school. The process of design and development of CSBake is explained. Figure 1 shows the interface of the CSBake.

Figure 1: CSBake interfaces

The prototype will be tested to the autistic students in secondary schools with special education unit which taking bakery subject. Future work of this prototype will focus on analyzing the effectiveness of the CSBake as an assistive tool for Autistic students in secondary school.

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The Development of Disaster Management via Virtual Reality for Primary School Children

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Keywords: Virtual Reality (VR), disaster management, visualization

ABSTRACT – This paper presents the development of an engaging method to nurture awareness toward a disaster management for primary children using virtual simulation (VR). The purpose of this project was to provide awareness to the children on the danger of a disaster while providing training in the disaster management using the virtual reality technologies. Virtual reality technologies were chosen because it can provide a lifelike situation to users with a safer environment and cheaper cost. By combining the existing disaster management plans with the virtual reality technologies, the disaster environment that we want can be recreated and controlled so that users can see and experience the danger of a disaster. To achieve the project purpose, the primary school children ranging from 6 – 12 years old were chosen as the candidates. This paper specifically highlights an innovative development of the disaster management awareness by providing a VR simulation that can enhance the procedure and learning experience to the children.

1. INTRODUCTION

According to the dictionary, disaster is a sudden accident or a natural catastrophe that causes great damage or loss of life. A disaster can be divided into two categories that is the natural disaster and the man-made disaster. A natural disaster like earthquake, tsunamis, hurricane or floods is a natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damages. While a man-made disaster is the consequence of technological or human hazards and mistakes, like industrial accidents, oil spills, nuclear radiation and many more.

Various measures have already been taken to address this disaster-related issues, but the level of awareness toward the disaster among the society is still very low. Although in Malaysia, the disaster events that occurs here are not that serious and rarely happen, it can still pose a high risk of threat to the society. Noraini Omar Chong et al. [4] mentioned that the National Disaster Management Agency (NADMA) have already organized 'Awareness Campaign on Disaster' in order to educate the society about the disaster situation. Even though various efforts and technologies have been used to deal with the disasters, it still does not cover the whole country as there are still some part that are exposed to the disaster. One of the initiatives that has been implemented is to conduct fire training in schools but such exercises have less efficacy as it only teaches student how to put out fire and nothing else. This traditional practice has many weaknesses and disadvantages as it does not provide much exposure to students for how to deal with real disaster situations, and may give rise to problems when the real situation occurs. The goal of this project is to help increase the awareness toward the disaster inside of the students and also to give training and education on how to manage in a disaster situation. Rajit Pimpale et al. [1] stated that Virtual reality technology will be used to develop this application in order to produce the disaster environment that will give the user the training and exposure on how dangerous is a disaster can be.

2. LITERATURE REVIEW

Disasters has already been a long-standing occurrence that has happen throughout the whole world. It has been since the ancient time where human and disaster live along each other. Many kinds of prevention and preparation has been made by the human to face with the disasters. In contemporary academia, the inappropriately management of risk are the consequences that cause disaster. As we know, disaster is divided into two type of classification which are natural disaster and man-made disaster. A natural disaster is a major adverse event that is resulted from the natural processes of the Earth such as floods, hurricanes, tornadoes, volcanic eruptions, and other geologic processes. While the man-made disaster or anthropogenic hazard are the disaster that is caused by human action or inaction, such as criminality, war, power outage, fire, and others. As the disaster can always happen when no one is expected, various ways have been implemented in preparation for the disaster.

Even though in Malaysia disaster rarely happen, there are still some disaster occurred repeatedly every year. Some of the disaster that occur frequently in the country are floods, flash floods, and landslide. Some example of the disaster that has happen in Malaysia such are the tragedy of the Highland Tower, the Greg Storm in Sabah, the disappearance of flight MH310 and recently

the river pollution at Pasir Gudang. Although the disaster that happen does not look so serious it does not mean there are no dangers involved in it. It is fortunate that the geographical of Malaysia also played an important part as the country are protected in every corner from any major catastrophe such as earthquake, volcanic eruption, tsunami, and typhoon. Even the weather that is hot and humid and the uses of natural energy cause the country to have small cases of man-made hazard to ever happens. But this does not mean that the country should ignore the safety of the nation, rather it should improve the safety management of the country so that the people will be prepare when a disaster occur.

The Disaster Risk Reduction (DRR) is known as a systematic approach in identifying, assessing and reducing the risk of a disaster. The aim of the Disaster Risk Reduction (DRR) is to protect the communities from hazard or disaster and minimizing the community's vulnerability to risks of disaster. Where it is different from the traditional disaster management which focused on response, rehabilitation and rebuilding after disaster. For DRR to achieve a meaningful and sustainable reduction in disaster the whole community which is the government, academic institution, private sector, civil society, and others needs to be involved. According to Center for Excellence in Disaster Management & Humanitarian Assistance [5] the involvement of such organization has resulted in Malaysia to modifying their disaster management cycle to suit existing legislative directive, promote consistent practices, and accommodate practitioners from multidisciplinary background. One of the projects that is ongoing in Malaysia is the 'Mercy Malaysia' organized by the Community Based Disaster Risk Management (CBDRM). Among the crucial program conducted is the School Preparedness Program. Mercy Malaysia [3] stated this program is designed to raise the awareness amongst student about the disaster they face and to help schools to minimize the risks posed by the natural disaster, such as the seasonal floods. In this program the students are taught simple hand on activities to prepare them to take responsibility for their own safety in case of an emergency event.

Figure 7: Mercy Malaysia, School Preparedness Program [3]

Reason why such program uses the education sector to promote and increase the awareness of the community is because school is the easiest medium to teach the community about the disaster. As nearly all the children around the world need to go to the school thus making it a suitable target to taught the student about the management risk as synonymous with proverbs 'strike the iron while its hot'. Children are the treasure that will shape the future, thus imparting a reliable knowledge and developing the important skill in them from the earlier age can help make them a better future. Teaching the student is important but a reliable method or medium is needed to deliver the content of the subject. Virtual reality technology is one of the best method available to be used to help in delivering the information. E. Kiruba Nesamalar et al. [6] state that one of the advantages in using virtual reality is that many different fields can use virtual reality as a way to train students without actually putting anyone in harm's way. Although there are some issues concern about children using a virtual reality headset it does not mean that they cannot use it. The main concern when children using a virtual reality headset are that the images may cause the eye to focus in a way that can quickly cause fatigue and strain, and extended exposure to those stresses can may cause eye damage over time. But as the research are still in progress it is not know much about the long-term effect especially on children. Differ when the children use smartphone where they typically hold the phone very close so that they can focus their eye that may cause a problem to the eye, the virtual reality headset help focuses on the image as the optic is setup to stimulate the effect of the real eye lessen the effect to the eye. That mean virtual reality headset may be less of a problem than books or smartphone. As it says, children can use the virtual reality safely but expected caution is needed to avoid any major problem.

Rajit Pimpale et al. [1] listed the reason why virtual reality is chosen as the deliverable medium for the disaster preparedness is because it has been recognized as an important and novel alternative to real-life drills and tabletop exercise. The virtual reality technology is capable to recreate the disaster simulation to help in the exercise in a safer environment. Other than being cost effective, the disaster simulation can be tailored and scalable to the user preference causing it to be usable in any other region of the world. With the current improvement of virtual reality technology, it is now more available to the community to use as a training exercise for disaster preparedness.

In this project there are several objectives that is needed to be verified as to ensure the effectiveness and the workability of the product is according to the target purpose. To ensure that, there are several objectives that must to be understand and achieved, which are:

- To study on the use of virtual reality simulation can make to the disaster management procedure.

- To develop a virtual reality simulation in where it can help to increase the awareness of the user toward the disaster while also educate and trains them to be ready when facing a disaster situation.

- To evaluate the effectiveness of virtual reality simulator in helping to spread the awareness of the safety management to the user compared to the traditional method.

3. METHODOLOGY

In this project the methodology that being use is The Three-Dimensional User Interface Development (TRES-D), which is according to Jose P.Molina et al [2] the methodology is introduced with the aim to put together the best of those previous approaches in an iterative and incremental development process that can be adapted to the variable complexity of different developments. This methodology cycle is divided into 6 phases that is:

Table 1: TRES-D Methodology

Phase	**Activity**
Initial Requirement	In this phase, the initial requirement needed for the project such as the objective, problem statement, and the solution are discussed in order to prepare the layout for the design of the product
Understand Requirement	In this phase, after understanding the requirement for the product, research needed to done to further strengthen the understanding of the research topic.
Concept Design	At this phase, the concept of the product is manifested and designed according to the data gathered.
Interactive Design	On this phase, the interactivity of the product is designed and combined with the concept design to make the final design
Building and Implementation	In this phase, the product will be build based on the requirement and the design that has been made. After that it will be implemented into the device for testing.
Deploy and Maintenance	Finally, in this phase, after the testing that has been done the final product will be released and to see what further improvement can be made.

4. RESULT AND DISCUSSION

In this project, the main platform that is going to be used for the system development will be the Android devices. The focus of this project is by applying the Virtual Reality (VR) technology on smart phone or tablet devices. As the software Unreal Engine 4 is the software going to be used to completely build this project product there are only one SDK that is needed to develop the mobile application which is the NVidia Android SDK. As the NVidia Android SDK is an already build in add on for the Unreal Engine 4 and just needed for a plugin, making it easier to build the mobile application as the comes together with the development software. The Unreal Engine 4 and NVidia Android SDK is chosen for this project is because it is free and contain its own library source package that can help beginner to develop a VR application.

With that, the application will be supported with a VR headset device and a controller to help the user to experience the simulation environment that was created. The application must also be assisted and installed into a compatible Android version phone for it to execute the software smoothly. Refer to figure 2 for system architecture and figure 3 for the system flowchart.

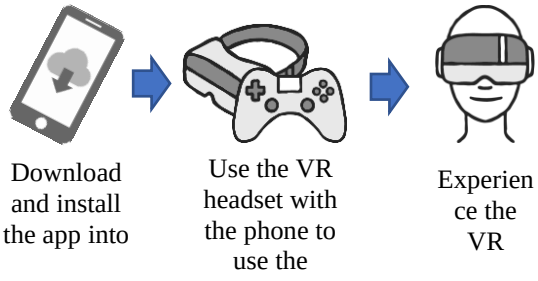

Figure 2: System Architecture

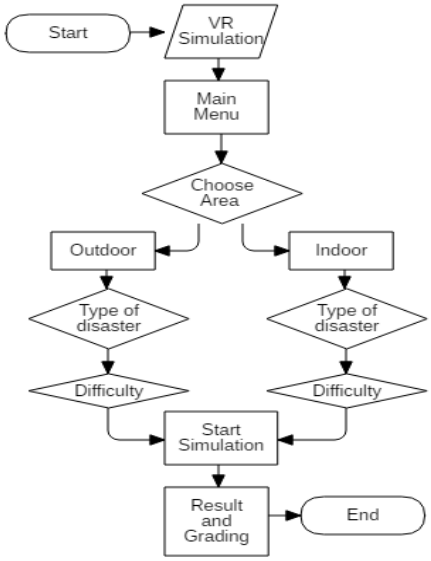

Figure 3: System Flowchart

5. CONCLUSION

In conclusion, this project has been successfully developed to achieve certain objective in helping to increase the awareness of the user toward the disaster. By having this project, we hope that user is motivated learn about the danger of the disaster and how to manage themselves when facing the situation itself. User can also get to experience the disaster situation themselves in a safer environment and with a cheaper cost. For future work, the application should include the ability to store history of user simulation experience and also adding more type of disaster environment that exist for the user to experience. The proposed model will be further evaluated by using usability evaluation (heuristics evaluation and questionnaire).

6. ACKNOWLEDGEMENT

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Enhancing student's engagement and interest in the Al Quran comprehension and translation through Collaborative Learning Game (Pahlawan Qarin)

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

ABSTRACT – Digital games can be an '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. These digital games encourage students to work hard and try repeatedly, gaining much-needed practice. Research has continuously shown such that game-based learning (GBL) is a way to engage students and appeal to diverse learning styles. ***Pahlawan Qarin*** is a game based application developed to serve as a medium of learning Al Quran comprehension and translation in order to understand the meaning and usage in daily lives. The medium of language used is in Malay Language. It may be used as an assisting tools for teachers in Al Quran recitation and education topic that are also taught in Islamic Studies subject in schools. ***Pahlawan Qarin*** is being presented as a 'desktop' (Personal Computer) game which 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). Students are proven to be highly engaged in a game playing session when collaboration with other partners are being done thus encourages them to complete any task given.

1. INTRODUCTION

Researchers have indicated that educational computer games could be an effective way of providing a more interesting learning environment for acquiring knowledge [1], [2], [3]. Several studies have reported that educational computer games could enhance students' learning interest and motivation [4], [5], [6], [8]. It was further indicated by Hwang *et. al.,* [7], that well-designed educational computer games might have great potential for improving the learning achievements of students.

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 finishes 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 has always been the common way chosen by parents and teachers, which is by using printed paper based or 'hardcopy'. With the new age technology and connectivity through internet networking, teenagers nowadays have the choice to play while learning with their peers, creating an interactive world of learning in a 'fantasy' realm.

2. 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 the player has to do to destroy the 'Qarin' is 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)

which means that further development will be scheduled soon.

Prior to designing the product, requirements were gathered in early February 2019 through several sessions with a Focus Group consists of individuals from different age group and roles. Table 1 shows the information of the Focus Group. The method used was through interview sessions. Among the questions asked were regarding the kind of interest that these teenagers have in Islamic Studies especially in Al Quran, their current way of learning, knowledge on usages of Al Quran verses, interest in digital games for learning purposes as well as interest in 'multiplayer' game. Based on the information gathered, we managed to come up with a storyboard of the game which had the outline of technical aspect and structure of the game play.

Role	Primary School	Secondary School	
	Age 12	Age 13	Age 15
Students	2	1	2
Teacher	1		1

Table 1: Focus Group information.

Based on the designed storyboard as well as the concept of 'multiplayer' game that we intended to incorporate, we had established 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. The characters (player and zombie), environment and objects in the game were imported from the free Unity Asset Store as well as 3D Warehouse (https://3dwarehouse.sketchup.com) which is in SketchUp format (.skp). 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.

In Unity, a script must be attached to the GameObject in the scenes in order to be called by Unity. All the languages that Unity operates with are object-oriented scripting languages. Here, we used C# and the script is created, edited and debugged in Visual Studio. Adobe Illustrator was also used for designing purposes. Videos in the game were made using Microsoft Power Point with animation feature, CorelDraw and Filmora. Throughout the development process, Unit Testing and Integration Testing were constantly conducted to ensure that the code and output intended runs smoothly in multiple client's screen and environment. Figure 1 shows 4 scenes in ***Pahlawan Qarin*** starting with the Main Menu, Login or Player's Registration, Al Quran Recitation segment and Game Play Level 1.

The tools needed to implement the game is a personal computer (PC) with Windows operating system (OS), internet connection, keyboard and mouse as the input controller. As the game introduces 'multiplayer' concept, all students played simultaneously in their selected 'room' (5 groups consists of 3 persons each). The teacher also played the game, joining one of the student's group. The students were grouped accordingly so as to speed up the implementation process and to make sure that the session runs smoothly. Once they get connected by joining room, they were taught or showed Al Quran verses, recitation and translation in which they have to remember these important elements; (i)the negative criteria, (ii)verses name and (iii)verses line number. After the Al Quran recitation session ended, the game level started. Each level has their own Al Quran recitation session. Only the player that is still alive in the game (won the level) may continue to the next level. There was no specific time given for the students to complete their game playing session. From all 14 students, only 7 managed to finish all 3 levels. The implementation session took about 3 hours altogether which comprises of these activities; (i)setup (installation and connectivity test), (ii)briefing, (iii)pre-usage data collection, (iv)playing session, (v)post-usage data collection and lastly, (vi)discussion on feedback with the teacher and students.

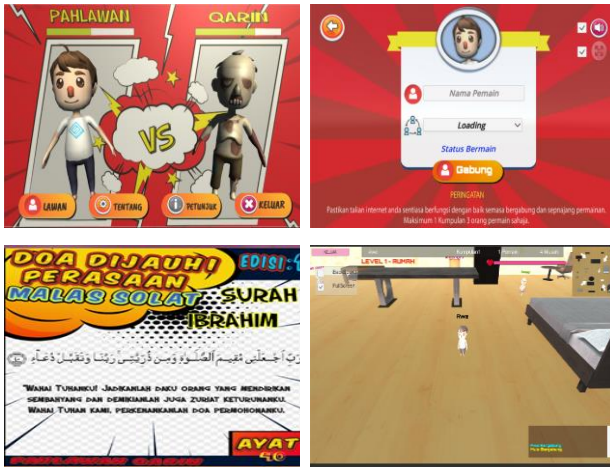

Figure 1: Scenes in ***Pahlawan Qarin*** game.

To measure the effect of using the game, questionnaires were given. The students and teacher were given 2 sets of questions which represented (i)pre-usage (teacher:https://docs.google.com/forms/d/151ix8GpwZd-Ka56L0MEFjenokUA1GD8dbXswD6_GYl0t; students: https://docs.google.com/forms/d/1QFsUKSHex0BXShk1-QoKCbtZR3nFdZ43HoZoYTCvQjo) and (ii)post-usage (teacher: https://docs.google.com/forms/d/12T2bJySqC8DYarUadJX4G-zMGuJkFxOiz1IZZ7tJX7w; students: https://docs.google.com/forms/d/11wRNdtrNjYN-18LLiIOdihRB15wX1f7PoGT13HVZeQI). Prior to the session, both the teacher and students have been explained on each of the questions in those questionnaires. Discussion were made with the teacher beforehand, regarding criteria to measure 'engagement' aspect. Based on the agreement made, we decided that these criteria will be used; (i)body language, (ii)facial

expression, (iii)enthusiasm shown and (iv)level of participation.

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 school's computer room. Two sets of questionnaire (pre-usage and post-usage) were presented to each of the students and teacher. After the session ended, further analysis on the collected data were done to eliminate any redundancy as well as to summarizes the results accordingly.

3. RESULTS AND DISCUSSION

As our study focused on enhancing the engagement and interest in Al Quran studies using CLG, thus we presented Table 2 as the proven result that CLG indeed has a big impact towards student or teenagers. The average increase of engagement and 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 which are being 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 & graphic aspect, animation, visual design) (iii)user friendly feature, (iv)preference in 'multiplayer' feature and (v)originality of the product.

Samples	(1) Teacher Observation on students	(14) Students Feedback
	Average %	
Before using CLG	75	68
After using CLG	90	88
Increment (%)	15	20

Table 2: Level of engagement & interest in Al Quran teaching & learning session.

Elements	(14) Student's Feedback		
	Disagree	Agree	Strongly Agree
Usability	1	5	8
Attractiveness	0	10	4
User Friendly	0	8	6
Multiplayer	0	0	14
Originality	0	0	14

Table 3: Results for other elements of the product.

Most of the questions asked in the questionnaire requires an Agreement answer based on values (1= Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree). Overall, the feedbacks received were mostly positive which includes 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.

4. CONCLUSION

This study presents findings on the implementation of a Collaborated Learning Game (CLG) approach in learning Al Quran comprehension and translation. Pahlawan Qarin, a real time 'multiplayer' game was develop to test the student's level of engagement when using this product. The results 'before' using the game and 'after' using the game were collected in order to make a comparison. The findings show that students using CLG have better 'engagement' toward the Al Quran teaching and learning session compared to the usual approach which is by solely using printed medium (hardcopy). In future, we will further analyze the effectiveness of Pahlawan Qarin on a wider volume of sample (usage by more students and teacher).

5. ACKNOWLEDGEMENT

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

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Students' Perceptions of Using Augmented Reality and Mobile Applications to Enhance Their Listening Skills in the 21st Century Classroom

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Keywords: augmented reality (AR), listening practices, mobile applications, self-directed module, video media

ABSTRACT – Students nowadays prefer the incorporation of multimedia as part of their learning tools (Prensky, 2001) and they 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 students' needs for the 21st century learning. However, in today's world where students' life cannot be separated from technology and the Internet, listening lesson using audio and moving visual images (video media) is made possible. Students not only have the chance to get access to millions of authentic videos online from all over the world, but also have the freedom and flexibility to pause, stop or replay the video according to their needs. Thus, with the integration of Augmented Reality (AR) and mobile applications, a model of listening practices namely MyEVO is developed. This innovation is aimed to modernize the existing traditional method in teaching and learning of listening skill into an on-the-go practice. The main objective of the survey conducted in this study is to identify students' perceptions of using AR technology and the mobile applications to enhance their listening skills in the English language classroom. The findings concluded that students have positive perceptions about AR and mobile applications to aid the understanding of a listening lesson.

1. INTRODUCTION

The emergence of a wide variety of advanced technology has created a positive impact towards 21st century education. In today's world, students 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 independent 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 students' needs and able greater personalization of learning experience. Students 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 decade, teaching English specifically the listening skill was very challenging when teachers had to bring in technology such as radio, laptop and speakers into the classroom so that students can listen to variety of authentic audios of native speakers. However, in the 2nd language classroom where the skills in listening are concerned, the application of advanced technology in teaching is undeniably possible as today's students are readily equipped with smartphones and Internet connection. Thus, to be relevant with today's situation, a model of listening practices that allows students to listen and also watch the movements and gestures of the characters in the audio (video media) is developed, and designed according to the different learning outcomes for intermediate level of tertiary education students. MyEVO is a revolutionised 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 practising their listening skills. 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. The value aspect of the listening materials has also been embedded in the module through the addition of higher order thinking skills (HOTS) questions as to be relevant to the current revolution of Education 5.0.

In this paper, students' perception using MyEVO as a self-directed module in learning listening skill in an English Language classroom was analysed.

2. METHODOLOGY

Samples: 81 Universiti Teknologi MARA (UiTM) and 80 Universiti Sains Islam Malaysia (USIM) undergraduate students from various faculties were randomly chosen to answer a questionnaire. This questionnaire was adapted from a previous study on listening assessment carried out by Sulaiman, Faizul Ganapathy and Ismayatim (2019). The feedback of the students on the experience of using MyEVO module was

collected via Google Form. The students were firstly given the module to answer sets of listening practices before they can answer the questionnaire.

Design & Development: MyEVO is a self-directed learning module with the main aim of helping students to acquire the language (specifically listening skill) through the application of current and up-to-date technology - the Augmented Reality (AR) and mobile applications, where students no longer need to depend 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, students can now do listening practices at their own pace by scanning the pictures in the module that trigger the AR technology. 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 have to download the HP Reveal application before they can get access to and follow 'MyEVO aura' page), 5 listening comprehension questions, 2 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. The purpose of using this strategy in submitting students' answers is to encourage the learners to be active in their learning and to encourage the learners to also understand other people's perspective about the issue being discussed in the practice.

Implementation: A total of 489 students from various faculties in both UiTM and USIM have attempted listening practices in MyEVO module. These students were given the module during their English language class. The students firstly scanned the AR trigger image on each practice before watching and listening to the video attached. The students then answered all 5 listening comprehension questions in the module. The students also attempted 2 HOTS questions and submitted their answers on 'MyEVO community' page. However, out of 489 students who have used this module, only 161 students answered the questionnaire distributed through Google survey.

Instrument: This study employed quantitative method with the use of online questionnaire for data collection. The questionnaire consists of three (3) parts;

1) Students' perceptions on the content of the listening practices in MyEVO
2) Students' perceptions on using MyEVO as a self-directed module in learning listening skill
3) Students' perceptions on the future of listening practices

Data Collection Procedure: Data collection was conducted in one semester. Sets of listening practices in the module were attempted by the students and their experiences and perceptions of using the module were captured through a questionnaire at the end of the semester. The listening lessons and e-activities in MyEVO module were implemented as an alternative to replace the traditional way of using CD, laptop, speakers and projector during listening lesson conducted by language teachers in English language classroom.

3. RESULTS AND DISCUSSION

Table 1: Students' Perceptions on the Content of the Listening Practices in MyEVO

Criteria	Agree	Neutral	Disagree
Interesting, up-to-date and meaningful context	90.5%	8.9%	0.6%

Adapted from Sulaiman, Faizul Ganapathy and Ismayatim (2019)

Table 1 shows students' perceptions on the content of the listening practices in MyEVO. The result shows that majority (90.5%) of the students agreed that the materials and the video used in MyEVO module are up-to-date, interesting and meaningful. This positive result demonstrates that due to the current advancement of technology and Internet, a variety and interesting materials of video media are made possible to be integrated in the 21st century English language classroom, specifically for the listening lesson. Studies conducted in the past also showed that students would like to be assigned with activities that involve technologies and those activities should be relevant to their lives (Essary, 2014)

Table 2: Students' Perceptions of Using MyEVO as a Self-Directed Module in Learning Listening Skill

Criteria	Agree	Neutral	Disagree
I enjoy using MyEVO module	81.6%	17.2%	1.2%
I can use MyEVO module anytime and anywhere	82.3%	17.8%	0%
MyEvo module offers interactive features	80%	19.4%	0.6%
I prefer to use MyEvo for future listening practices	81.2%	17.6%	1.2%
I would recommend MyEvo to my friends	80.6%	19.4%	0%

Adapted from Sulaiman, Faizul Ganapathy and Ismayatim (2019)

Table 2 shows students' perceptions of using MyEVO as a self-directed module in learning listening skill. The majority of the participants agreed that they enjoy using MyEVO module (81.6%) and they can use it anywhere and anytime (82.3%). A high number of the students

(80%) also agreed that MyEVO offers interactive features which allow them to watch the video and share their answers for the HOTS questions in just a few clicks. The findings also revealed that the majority of the students prefer to use MyEVO for future listening practices (81.2%) and would recommend it to their friends (80.6%). These findings concluded that the majority of the students responded positively towards the presence of visual and the incorporation of Augmented Reality and mobile application in language classroom as these help the listening lessons to be more enjoyable, interactive, and convenient. This is in line with the findings of Rahimi and Soleymani (2015) and Read and Kukulska-Hulme (2015) where it is proven that mobile applications can reduce students' anxiety and sustain students' motivation.

Table 3: Students' Perceptions on the Future of Listening Practices

Criteria	Yes	No
In the future, do you think your listening practices should integrate both audio and video? (video media)	96.5%	3.5%
In the future, do you think your listening practices should integrate the use of technology (Augmented Reality) and mobile applications?	82.3%	17.8%

Adapted from Sulaiman, Faizul Ganapathy and Ismayatim (2019)

Table 3 shows students' perceptions towards the future of listening practices using both audio and video and also listening practices using Augmented Reality and Mobile Applications. A high percentage of the students (96.5%) agreed that the future of listening practices should integrate both audio and video where they have the opportunity to listen and at the same time see what is happening in the setting of the video media. A majority of the students (82.3%) also agreed that the future of listening practices should integrate the use of Augmented Reality and mobile applications. This finding illustrates that the majority of the students show positive response to the use of Augmented Reality and mobile applications in their English language classroom specifically for listening practices. Mobile learning makes learning more enjoyable, flexible and interactive as students are not rendered immobile by the restrictions of the traditional classroom settings or the old-fashioned desktop computer technology (Kukulska-Hulme & Traxler, 2007).

4. CONCLUSION

This study presents findings on the second language learners' perceptions of using MyEVO module which integrate the use of Augmented Reality and mobile applications to enhance their listening skills in the 21st century classroom. This module is designed with the purpose to replace traditional audio only method during listening lessons and also with the intention to replace the previous method of using radio, laptop and speakers in the English language classroom. The analysis to find out the students experience using video media approach and the use of Augmented Reality and mobile applications was conducted. The findings show that students have positive perceptions about the use of these tools to aid the understanding of a listening lesson. Students also have positive perception that in future, listening practices should integrate the use of both audio and video and also the incorporation of mobile applications for a more enjoyable and meaningful experience. Through the incorporation of audio and moving visual images (video media) in completing the practices, the module is seen as relevant to the current digital natives as all the videos are authentic, related to everyday life issues, not scripted and can be easily accessed. This means that students do not solely listen to the language audio available online, but also watch the attached videos in order to gain better understanding of a certain issue. The use of Augmented Reality is also seen as relevant for listening lessons in the 21st century classroom as it helps students to get access to the videos online without having to wait for the teachers to play the audio or video in class. In the 21st century education, teaching and learning in the Malaysian classroom is perceived as ready to move on to wireless era as many areas especially in the university areas, have been equipped with wi-fi services (Nik Mastura Nik Mohammad, Mohd Nor Mamat & Posiah Mohd Isa, 2011). For future research, we will further analyse the effectiveness of using Augmented Reality and mobile applications on students' performance.

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Integration of Augmented Reality Application for Interactive Internet of Things Module

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Keywords: Augmented Reality, Internet of Things, module development

ABSTRACT – The surge in the industry revolution 4.0 requires skillful TVET graduates in applying/integrating hardware technology towards the Internet-based digital world. For that, the mastery of programming and electronics is important. Current Internet of Things (IoT) modules are lacking interactive features and sometimes require students to understand the installation steps by reading lots of texts. In addition, students cannot visualize the output of the installation. Therefore, there is a need to develop more effective learning methods to help students acquire skills in applying/integrating hardware technology towards the Internet-based digital world. The benefits of Augmented Reality (AR) are seen as the greatest potential in realizing effective learning resources for students to acquire the necessary skills. Integration of Augmented Reality Application for Interactive Internet of Things (iAR-IOT) module is developed to assist students to understand IOT concept. , iAR-IOT was designed and developed based on the ADDIE model. The prototype is judged by 3 subject matter experts and adjustments is done according to their suggestions and recommendations. A set of questionnaire was distributed manually to 30 IOT Short Course participants. Data were obtained was analysed through the SPSS 19 statistical packet programme. The highest mean is item 3 (the supporting material is motivates learning), meanwhile the lowest mean is item 10 (the supporting material is helpful to see tutorial output). However, all items are highly acceptance. The iAR-IOT module is an alternative teaching materials that provide the tutorial installation steps correctly. The use of this innovation in the classroom will have a good impact on students in acquiring basic skills in applying / integrating device technology towards an Internet-based digital world.

1. INTRODUCTION

Internet of Things (IoT) is recently one of the most-talked-about issue in Technical and Vocational Education and Training (TVET). The surge in the industry revolution 4.0 requires skillful TVET graduates in applying/integrating hardware technology towards the Internet-based digital world. Furthermore, the rapid growth of IoT applications has increased the demand for experienced professionals in the area [1]. This directly requires the mastery of programming and electronics.

Current IoT modules are lacking interactive features and sometimes require students to understand the installation steps by a lot of reading. In addition, students are unable to imagine the output of the installation. Therefore, there is a need to develop more effective learning methods to help students acquire skills in applying/integrating hardware technology towards the Internet-based digital world. The benefits of Augmented Reality (AR) are seen as the greatest potential in realizing effective learning resources for students to acquire the necessary skills.

AR technology can provide a better visualization on teaching and learning for education that can enhance usability and motivation of study [2]. It helps in explaining the process, simulation aids that can attract users, describing things clearly, explaining the concept of spaces and suitable as experiment substitution. Since AR technology able to provide better visualization for the teaching and learning process, the need of using AR in education is encouraging. This paper proposes to integrate Augmented Reality Application in Interactive Internet of Things Module.

2. METHODOLOGY

This study aims to design and develop an interactive Internet of Things module using Augmented Reality application (iAR-IOT) and evaluate the user acceptance towards the prototype. In order to achieve the aim, iAR-IOT was designed and developed based on the ADDIE model.

2.1 iAR-IOT Development

ADDIE model introduced by is the most used framework by educators in building effective support tools because of its flexibility [3]. The model consists of five (5) phases called Analysis, Design, Development, Implementation and Evaluation.

In analysing steps, an exploratory study was carried out on a recent study related to the implementation of AR in education to determine the media usage and learning method used. A literature study was conducted qualitatively using document review approach. In addition, analysis of user requirement, software and hardware will be taken into the design phase.

In the design phase, the prototype was design based on the selected learning method and instructional design. The instructional design was adapted from [4] experiential learning approach.

In the development phase, the iAR-IOT module was

developed using HP Reveal software. iAR-IOT was presented in a printed version. iAR-IOT module consists of two tutorials and one project. In every tutorial, students can download the source codes, installation video guidance and output video. The first tutorial is to control LED using web. The second tutorial is to control LED using Blynk Application. Finally, students need to overcome Home Automation project using web and Blynk application. Testing toward the developed prototype is conducted to make sure the functions run well before pilot testing takes place. The prototype is judged by 3 subject matter experts and adjustments is done according to their suggestions and recommendations.

In the implementation phase, the prototype, which has been designed and developed, was testing to make sure the functions run well. Participants for the implementation phase were from IOT Basic short course participants. Data were obtained from 30 questionnaires and analysed through the SPSS 19 statistical packet programme.

To validate the prototype, a five (5) Likert scale questionnaire adopted and modified from [5]–[8] are distributed personally to participants. The results will determine the readiness of the prototype. This feedback is greatly important to ensure the prototype functionality and readiness for the real study.

3. RESULT AND DISCUSSION

This section presents the findings based on the focus of this study, which is to validate the iAR-IOT module to find out whether the prototype developed meets user's expectation. A User Acceptance Test was carried out to obtain accuracy and consistency. The testing is performed by 30 Basic IOT short course participants. In this study, reliability test has been performed and Cronbach α values were 0.935. [9] indicates that a questionnaire has high reliability if the Cronbach alpha is above 0.80. Therefore, it can be concluded that the internal consistency of the data was achieved.

Table 1: User Acceptance Testing Result

	The supporting materials …..	**Mean**	**Acceptance Level**
1	is easy to use	4.91	Highly Acceptance
2	is helpful to understand the contents	4.84	Highly Acceptance
3	**is motivates learning**	**4.97**	**Highly Acceptance**
4	is more attractive to student learning new technical subjects	4.88	Highly Acceptance
5	is helpful to understand contents without indication of teacher	4.91	Highly Acceptance
6	is helpful to study and review contents by myself	4.88	Highly Acceptance
7	is could be used to repeat activities done in classroom for myself as homework	4.94	Highly Acceptance
8	is helpful to download tutorial source code	4.88	Highly Acceptance
9	is helpful to see tutorial installation	4.78	Highly Acceptance
10	**is helpful to see tutorial output**	**4.66**	**Highly Acceptance**

Table 1 shows that the highest mean is item 3 (the supporting material is motivates learning), meanwhile the lowest mean is item 10 (the supporting material is helpful to see tutorial output). However, based on the interpretation table by [10] indicated that all items are highly acceptance. The results indicated that the prototype is ready to be tested in the actual study.

4. CONCLUSION

Integration of Augmented Reality Application for Interactive Internet of Things (iAR-IOT) module is developed to assist students to better understand the IOT concept. The iAR-IOT module is an alternative teaching material that provide tutorial installation steps correctly. Furthermore, students can refer to the output they should obtained for each tutorial provided. Students are free to scan the image provided and view the video by themselves throughout the process. Such interactive application able to enhance the learning experience and provide freedom for learners.

This study attempted to validate iAR-IOT module. The results showed positive feedback, the prototype is working properly and ready to be used in real study. By integrating AR in teaching and learning process has benefit students and educators. The use of this innovation in the classroom will have good impact on students in acquiring basic skills in applying/integrating device technology towards an Internet-based digital world.

5. ACKNOWLEDGEMENT

The authors would like to thank Kolej Komuniti Bukit Beruang, Kolej Komuniti Selandar, Universiti Teknikal Malaysia Melaka (UTeM) and Ministry of Higher Education (MoHE) for their support.

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Improving Students Self-Efficacy Using a Humanize-Chatbot in Human-Computer Interaction Course

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Keywords: e-learning, self-efficacy, chatbot technology, human-computer interaction

ABSTRACT – The usage of Chatbot is very popular in a wide range of applications particularly in systems which have the intelligence support with the user. This project showed an implementation of Chatbot interaction in the field of education. Human-Computer Interaction (HCI) which is one of compulsory course offered to ICT students in most universities. The objective of this project was to evaluate the students' self-efficacy in learning HCI course. User Centred Design (UCD) model was used because it included an iterative process. This way, each step in the process can have an objective to be obtained. Amazon Web Service (AWS) Lex was used as a tool to provide intelligent features for Chatbot interaction in e-learning so that learners can interact with this technology. The results showed that students were more encouraged to learn the HCI course using Chatbot interaction through e-Learning. Overall, Chatbot in e-Learning acts as a useful teaching-oriented platform as it allows students to play an active role in building knowledge through dialogues, exchanges, and deepening tools.

1. INTRODUCTION

Chatbots are increasingly being used in fields such as customer support, education, and entertainment parallel with the evolution of artificial intelligence and virtual assistant. This project shows the implementation of Chatbot interaction as a question-answering (QA) platform in the field of education, hence assisting to improve the self-efficacy among students. The Human-Computer Interaction (HCI) course is important for students to know whether the interactions occurring between humans and computers is the result of a satisfying experience, or the experience which makes the interactions become more efficient and effective. However, most students tend to face the problem of getting confused over the process of interaction design occurring during the development phase of any project.
A recent research by Liu [1] has described a solution of using knowledge-based QA chatbot design in a university context. The research showed where 90% of user are more satisfied using the chatbot compared to using a common mobile map app, concluding students' interest are inclined towards a more interactive approach. Another related work was conducted by Go [2], showing that interactivity of messages works to compensate for the impersonality of low anthropomorphic visual cue and chatbot identity cue. Therefore, the proposed solution of improving students' self-efficacy is by using a conversational robot i.e. chatbot and web-based learning. Chatbot in e-Learning acts as a useful teaching-oriented platform as it allows students to play an active role in building knowledge through dialogues, exchanges, and deepening tools.

2. METHODOLOGY

User Centred Design (UCD) model can be used to enrich web-based educational systems' personalization capabilities with adaptive navigation support through recommendations [3]. We propose the adoption of a UCD approach to adaptive e-Learning systems.

Analysis phase: The methods used for gathering the requirements for this project are contextual inquiry and observation. Obtain 5-6 students and 2 lecturers in Human-Computer Interaction course with knowledge and expertise as participants to get data. Record the requirements with post-it notes using affinity analysis. Perform the study with the 5-6 students. While doing so, take notes using index cards and post-it notes. Then, jot down the exact quotes of the participants' speech or record direct observations of what they are doing. Prepare 40 notes from this study on separate cards and post-its. The next step is to analyze these notes and arriving at new concept ideas based on the data collected.

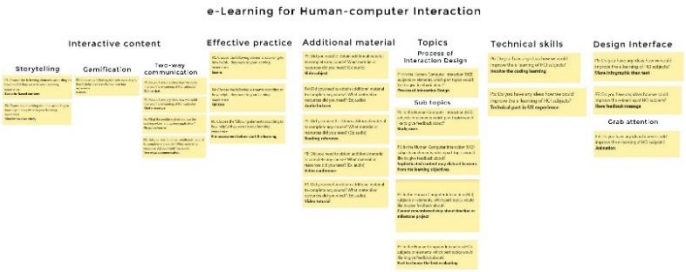

Figure 2.1: Final Affinity Analysis Diagram

The theme was found from the final affinity analysis diagram as shown in Figure 2.1 below.

Design phase: UCD model is an iterative process. Thus, it starts with a scratch of an idea until the application is developed and implemented. A paper prototype is used as a guide in the analysis and research. From this prototype, the developer refers to each process and focuses on needs of requirements. Amazon Lex is an AWS service for building conversational interfaces for

applications using voice and text. [4]. Amazon Lex allows any developer to quickly build a chatbot conversation. After a Chatbot is built using Amazon Lex and tested using the Amazon Lex console, deploy it on the website as shown in Figure 2.2 below.

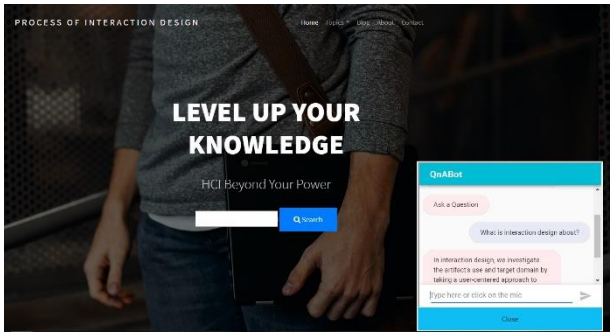

Figure 2.2: Deploy Chatbot on Website

Implementation phase: Self-efficacy is the belief in the personal capacity to carry out a task and achieve the objective set [5]. The choice of measurement instrument for self-efficacy is General Self-Efficacy (GSE) as it has been the most frequently used instrument for this type of research.

Deploy phase: The deployment phase is the last phase in the UCD model. This project must be tested to the users and users must undergo every test phase, then only the application will readily be used by all users.

3. RESULT AND DISCUSSION

It is essential to understand the factors that influence the users' decision to accept or reject technology to ensure the successful implementation of new technology. Self-efficacy is one of the key drivers of human activity and has been found to, directly and indirectly, affect the intention and actual use of various technologies [6].

It has been shown that self-efficacy has a direct impact on the intention to use different technologies in the learning context. Thus, this project is to evaluate the students' self-efficacy in the learning HCI course using Chatbot interaction.

Evaluation of students' self-efficacy was measured by involving nine questions: For example, a question of perceived usefulness was formed as "I think the Chatbot would be useful in my job". See Table 1 for exact details. They could choose values between 1 (Totally disagree) and 5 (Totally agree). Then, student's overall self-efficacy was calculated by taking the average of the total result from the measurement. The research focuses on students who took HCI course and then fill the feedback form by online survey.

The total score was calculated by finding the sum of all items. For General Self-Efficacy Scale (GSE), the total score ranged between 15 and 45, with a higher score indicating more self-efficacy. [7]

Table 3.1 GSE results

Item	Score
1. Are you understand the whole content provided by the Chat-bot from the beginning	39
2. Are the Chat-bot help to enhance your knowledge in studying HCI subjects?	45
3. Can you answer the quizzes and exercise provided by the Chat-bot?	34
4. Do you able to discuss and revise the content of the HCI subjects by your own?	38
5. Does the content of HCI subjects in the Chat-bot similar to the other references books?	39
6. How good is the Chat-bot answered your questions especially for difficult questions?	46
7. Does the response and answer given by the Chat-bot satisfy your needs and meet your demand?	40
8. Are the instructions/keywords instructed by the Chat-bot easy to understand and applicable in the conversations?	41
9. Does the hyperlink, video and image provided by the Chat-bot help you to explore more about HCI subjects?	39

The GSE scores were computed for 10 participants using this system. The average GSE score was shown with a reach value of 42. Most participants scored higher GSE on expressing their self-efficacy. These results support students' self-efficacy which improves through Chatbot interaction. First, the result shows that a higher score was already relatively high for "How good is the Chat-bot answered your questions especially for difficult questions?". This suggests students are already feeling encouraged to use Chatbot interaction in e-Learning to learn about HCI course, regardless of their levels of self-efficacy [8].

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WhatsApp for Learning Management System – Comparison between WhatsApp and Ulearn in Information Sharing

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Keywords: WhatsApp, information sharing, LMS

ABSTRACT – This paper discusses the implementation of WhatsApp as Learning Management System (LMS) that helps lecturers plan, execute and evaluate teaching procedures. This study focused on the information sharing component and compare to Ulearn. The effectiveness of information sharing using WhatsApp and Ulearn between lecturer and students is analyzed. 3 samples group of students were approached in different means of information sharing i.e., Ulearn, WhatsApp and control (no specific method) respectively. The results showed that information sharing through WhatsApp is much faster and the owner of the message able to know that the information reach the target. Therefore, WhatsApp is the best substitute to the drawbacks of Ulearn as LMS with respect to information sharing and broadcasting.

1. INTRODUCTION

A Learning Management System (LMS) is a software application for managing, documenting, tracking, reporting and delivering education, training or learning and development programs [1]. The concept of learning management system emerged from e-learning directly. Although the first LMS appeared in the higher education sector, today the corporate market is the focus of most LMSs. Learning management systems are the largest segment of the market for learning systems. The LMS was first introduced in the late [2]

Learning management systems have been designed to identify gaps in training and learning, using analytical data and reporting. LMSs focus on delivering online learning and support a variety of uses that act as a platform for online content, including courses based on both asynchronous and synchronous. An LMS can offer instructor-led training classroom management or a flipped classroom, which is used in higher education, but not in corporate space.

Ulearn is a LMS that is used in tertiary education such as UTeM. It helps educators plan, implement and evaluate learning processes. The system makes it easier for users to create content, monitor student involvement, track performance and deliver educational courses. This is a system centered on students that simplifies the learning process, allowing students to review their personal performance and improve their classroom or distance learning. The solution Ulearn LMS eLearning enables end-to-end facilitation, management and reporting of any online program or course. However, the implementation has several drawbacks and this paper will discuss two of them, firstly it is not friendly user and lead to the second drawback which is the information seldom reach the target. In Ulearn, announcement from educator of course is not appear at homepage. Student must log in and choose that specific course to see any announcement if any. If they missed the course, they will miss the announcement. Hence, Ulearn is not very user friendly and the chances of missing any information is quite high. It totally depends on the target user to often log in to the homepage and go through the course contents.

Therefore, this study proposed an application that can overcome the drawbacks of Ulearn called WhatsApp. WhatsApp is a free messaging software that operates across various devices such as iPhone and Android devices and is commonly used by undergraduate learners to submit digital emails such as pictures, videos, audios and easy sms messages [3]. Nowadays, all the students have smartphone and it always near them. Since the use of WhatsApp requires Internet facilities, lots of information can also be accessed in real time and the sharing of that information through technology is both instantaneous and convenient [4]. WhatsApp has collective characteristic such as group chat that can support up to 256 group members to interact and unlimited messaging [5].

This paper will report the methodology and finding of comparison between Ulearn and WhatsApp in term of user friendliness of the software and conveying information effectiveness in the following sections.

2. METHODOLOGY

Samples; The study was conducted using 3 samples which involve two cohorts of students that took 2 different courses: Sample 1 consists of 83 students from Artificial Intelligence course, Sample 2 is the Sample 1 but with different approach, Sample 3 consists of 98 students from Electronics Analogue course. The experiment was done in Semester 2 2018/2019 (from week 1 to week 12).

Design & Implementation; For Sample 1, all students in the sample were ensured to have smartphone and must join the group created by admin (student representative). WhatsApp is used fully for LMS of the course. This study only discusses with regards to information sharing component. All types of information such as announcement: adjourning a class, submission dateline; additional notice and etc, notes sharing, discussion and immediate response requirement were conveyed to the student by using WhatsApp only. The observation is from week 1 to 6 for this sample. For Sample 2, lecturer was fully used Ulearn for abovementioned information items and observation as was done in week 7 to 12. For Sample 3, lecturer could combine Ulearn with any other means of conveying information such as notice board, messaging Apps or orally in class. The observation for Sample 3 was done from week 1 to 12 in Semester 2 2018/2019.

Data Collection Procedure: For WhatsApp, the effectiveness of information reached the target user is observed in message info as shown in Figure 1 and conduct a survey. Message info allows the sender to know how many members open the message and when. At the end of message info, the number of members and who does not read the message can viewed as shown in Figure 2. For Ulearn, the data is gathered by viewing the number of responded and from surveys.

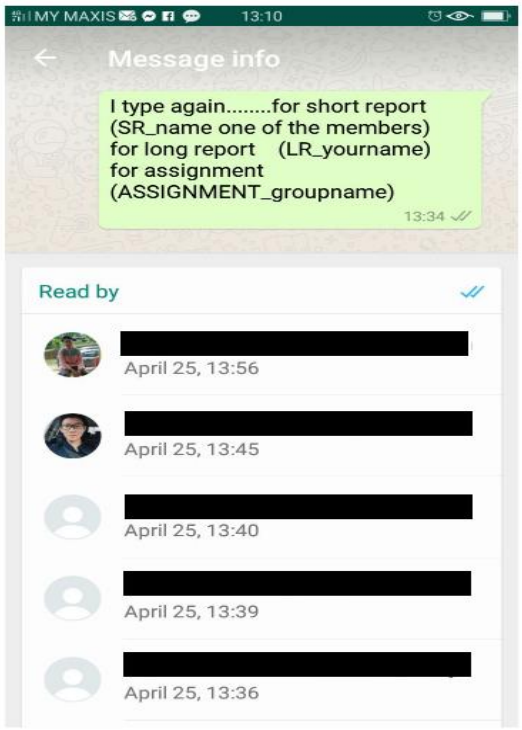

Figure 1: The example of message info that shows members who have read the sent message.

3. RESULT AND DISCUSSION

The types and numbers of announcement and task are different among the samples due to different courses and cohorts. Nevertheless, the focus of this paper is to evaluate the effectiveness of information reach the students in terms of time and respondent. Table 1 shows the results from Sample 1. It shows the percentage of students read the WhatsApp message/content immediately or on the same day, the next day and how many actually execute the task as stated in the message. Several types of message were given through the WhatsApp i.e., announcement of new venue of the class 2 hours before the class started, announcement of the test date, slide sharing, announcement of assignment dateline, announcement to response to a survey and discussion.

From Table 1, item 1 clearly needs immediate action from the students and it shows that all students received the message, and all executed the task successfully. Item 2 in Table 1, no immediate action needed but based on the time stamp of message info, all students read the message on the same day and all execute the task successfully. 81% opened the slide sharing message (as shown in Figure 3) on the same day and the rest read it on the next day onwards. Some part of the whole message in WhatsApp can be previewed at the home. Hence, as they know it only a slide sharing, no need to response immediately. Nevertheless, the slide reached the target successfully. 100% read the announcement of the assignment dateline and survey, but only 95% and 87% respectively follow the instruction given. The main point of this paper is to deliver the message to the target. If the target fails to follow instruction; we have no control and out of the paper scope.

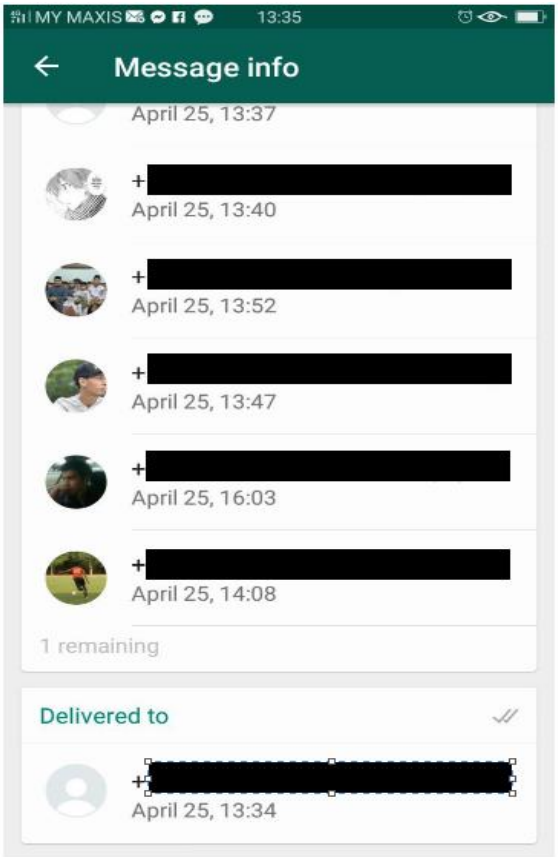

Figure 2: The example of message info that shows the list of group members who have not read the message

Table 1 shows the number of students read the message from WhatsApp and execute the task (if any) – Sample 1

	Message	Number of students read the message on the same day	Number of students read the message on the next day onwards	Implement the task (if any)
1	Announcement of new class venue (within 2 hours)	100%	0%	100%
2	Announcement of the test date and requirement	100%	0%	100%
3	Slide Sharing	81%	19%	NA
4	Assignment dateline announcement	100%	0%	95%
5	Announcement to execute a Survey	100%	0%	87%
6	Discussion	94%	16%	25%

The last item in Table 1 is conducting the discussion through WhatsApp. 94% read the whole discussion and 25% took part in the discussion. This shows the discussion contents were shared to the majority of the students and this is quite good outcome.

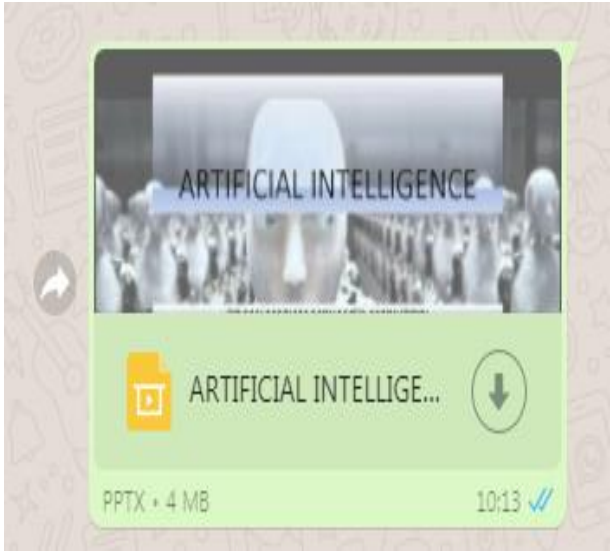

Figure 3: Slide sharing using WhatsApp.

After week 6, Ulearn is used to convey information to the students of Sample 1. Any other means of information sharing between lecturer and Sample 1 within week 7 to week 12 is not allowed. For this, Sample 1 is renamed as Sample 2. The results are shown in Table 2. Refer to Item 1 and 2 in Table 2, Sample 2 were required to execute quizzes in Ulearn within particular period. For Quiz 1, 93 % responded. For Quiz 2, the number declined to 71%. This shows that not all students notice the existence of the quizzes. No instruction of do not communicate between students given, hence, students could share the info among themselves that there is a quiz in Ulearn to be done. However, 7 % and 29 % for respective quiz missed the chances and could risk their overall marks. For item 3 in Table 2, which was need immediate response from the student and the time period for the poll was 3 days, only obtained 26% respondent. Compare to item 1 in Table 1, 100% Sample 1 were responded immediately. Item 4 in Table 2 is similar to Item 5 in Table 1, survey implementation. For this, only 40% of Sample 2 responded to Ulearn survey which is less 47% respondent from Sample 1 whose were responded to a survey announced through WhatsApp.

For Sample 3, where the means of information sharing between lecturer and students were free. Lecturers conducted the class as usual and need to fulfill

Table 2 shows the number of responses on

No	Message	Number of respondents
1	Quiz 1	93%
2	Quiz 2	71%
3	Class replacement poll (within 3 days)	26%
4	Announcement to execute a Survey	40%

announcement and tasks solely in Ulearn– Sample 2

30% blended learning requirement. Hence, they will use Ulearn for the LMS of their class. Based on the reports given by the lecturers, information sharing in Ulearn were not sufficient to ensure the info reach the students. Within week 1 to week 12, 3 observations were made and reported. Firstly, an announcement was given to Sample 3 through Ulearn, only 60% saw the message. The rest of the Sample 3 did not notice the message. This evaluation was done by executing a survey in class. Secondly, Sample 3 was required to upload report in Ulearn within a week, only 1% executed. The rest of the Sample 3 still need to be orally announced in the class to notice the information in the Ulearn. Lastly, an announcement was made in class to participate in a poll in Ulearn, only 45% of Sample 3 responded. As mentioned previously, methods of information sharing have no control to ensure the students execute the task as instructed. Hence, number of students that did not execute the task may not reliable to conclude that the info did not reach them. However, based on the first and second report of Sample 3, clearly in general, half of the Sample 3 always missed the information sharing in i.e., Ulearn and need other means of information sharing to ensure the message reach the students.

Based on results obtained, information sharing through WhatsApp is much faster and the sender able to know that the information reaches the target. WhatsApp is user friendly and the students do not have to constantly log in to the portal as Ulearn. The message has notification, and this ensure that the students notice the incoming message compare to Ulearn. Placing an announcement in Ulearn may reach to some of the students and by hoping the students to spread the news among themselves is not reliable.

4. CONCLUSION

This study presents findings on the comparison between WhatsApp and Ulearn is information sharing from the lecturer to the students. Based on results obtained, information sharing through WhatsApp is much faster and the owner of the message able to know that the information reaches the target. WhatsApp is user friendly and the students do not have to constantly log in to the portal as Ulearn. WhatsApp has notification and this ensure that the students notice the incoming message compare to Ulearn. Therefore, WhatsApp the best substitute to the drawbacks of Ulearn as LMS, in particular, information sharing.

5. ACKNOWLEDGEMENT

This study is conducted personally by the lecturers (authors) of Universiti Teknikal Malaysia Melaka (UTeM), and a great thank you to the students of Universiti Teknikal Malaysia Melaka..

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Proposed Effective Learning Design Model on Language Skills using Partial Least Squares Structural Equation Modeling (PLS-SEM)

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Keywords: Learner characteristics, language skills, student performance

ABSTRACT – The success in learning is the most significant issue in the realm of language learning such as lack of studies focusing on the efficacy of fully online language learning. Mostly existing researches were conducted for face-to-face and blended learning modes. Activities are an important part of language learning which involve skills for reading, writing, listening, and speaking. Existing studies also mostly focus only on partial skill activities. Therefore, this study proposes an effective learning design model based on the relationship between learner's characteristics and their self-efficacy in language skills. A survey design was developed to collect data and test the proposed model. A Partial Least Squares Structural Equation Modeling (PLS-SEM) was used in order to answer research questions. The survey was conducted on-line involving 130 respondents after completing Mandarin MOOC. The findings show that visual and thinking dimensions contribute to the effective learning design model that shows improvement in student performance for all language skills: listening, speaking, reading and writing.

1. INTRODUCTION

Massive Open Online Course (MOOC) is a new online learning method in education that is currently developing [1]. The design of MOOCs inevitably involves a focus on complex pedagogical, technological, and organizational issues [2]. Authors proposed ten dimensions for MOOC design model: general structure, resources, vision, learner background and intention, pedagogy, communication, assessment, technologies, learning analytics data and support.

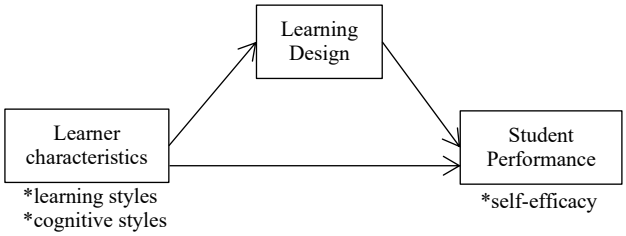

Figure 1: Theoretical framework

Language is an important instrument of communication among human being in a community. Previous researchers listed there are four type skills in language; speaking, reading, writing, and listening [3-7]. The language skills of listening, reading, writing, and speaking are distinct from one another [8]. In this paper, we propose an effective learning design model based on the relationship between learner's characteristics and their self-efficacy in language skills. Figure 1 shows the theoretical framework for this study.

Learner Characteristics

Learner characteristics can be personal, academic, social/emotional and/or cognitive in nature [9]. A Learner's characteristics are defined as an individual mental factor, suggested to impact on the learning activities of students. Previous researchers listed three types of learner characteristics; i) learning styles, ii) cognitive styles and iii) multiple intelligent [10-11].

Learning styles are innate preferences of individuals as to how they prefer to go about the process of learning and it is one of the dominant factors which affect the academic success of students [12]. Felder Silverman model was the most preferred model of learner style used in the learning theories compared others learning styles [13-15]. Previous studies found that eight dimension learning styles based on this model; i) active, ii) reflective, iii) sensing, iv) intuitive, v) visual, vi) verbal, vii) sequential and viii) global [12-16].

Cognitive styles are the characteristic, self-consistent mode of functioning which individuals show in their perception and intellectual activities [18]. The previous studies found that eight dimension cognitive styles; i) introversion, ii) extraversion, iii) sensing, iv) intuitive, v) thinking, vi) feeling, vii) judging and vii) perceiving [10], [19] and [20]. The previous study assumes that student's activity in e-learning courses differ based on the cognitive style preference. However, they may prefer different activities and benefit from different activities depending on their cognitive style [21]. Cognitive Styles as a main factor that effect on students' achievement [18], [19], [22] and [23].

Student Performance

Students performance is very important to get good grading in those processes which decide the quality of institutes [24]. S. Freeman [25] stated two outcome variables used to evaluate student performance; i) scores

or ii) failure rates. Previous researcher listed two issues student performance on learning outcomes; i) clear picture as pinpoint to student learn, ii) assessment information [26]. In order to address this issue, a MOOC usage approach is used to monitor student performance within a semester with appropriate learning activities [27].

Learning Design

According to H. Walmsley-Smith [28], learning design important to i) help online tutors and learning designers analyse and innovate, ii) facilitate software developers to instantiate lessons in software and iii) share designs with others. Learning design is a methodology for improving teaching and learning based on pedagogical theory and insights into students' activity and achievements [29]. Authors listed four indicators can monitor student academics through the learning design such as i) students' online activity, ii) online interaction, iii) academic performance (e.g., quiz scores) and iv) utility (tools used and time flexibility).

Self-efficacy

Self-efficacy refers to people's beliefs in their abilities to complete specific tasks to get goals and what people believe they can achieve rather than what is objectively true [30]. Self-efficacy is one of the factors may influence students' sense of ability to perform such as self-assessment [32].

In this paper, we propose an effective learning design model based on the relationship between learner's characteristics and their self-efficacy in language skills. Based on the above discussion, we hypothesize the following:

H_1: There is a positive relationship between visual and self-efficacy for student performance.
H_2: There is a positive relationship between visual and effective learning design for student performance.
H_3: There is a positive relationship between active and self-efficacy for student performance.
H_4: There is a positive relationship between active and effective learning design for student performance.
H_5: There is a positive relationship between thinking and self-efficacy for student performance.
H_6: There is a positive relationship between thinking and effective learning design for student performance.
H_7: There is a positive relationship between intuitive and self-efficacy for student performance.
H_8: There is a positive relationship between intuitive and effective learning design for student performance.
H_9: There is a positive relationship between effective learning design and self-efficacy for student performance.

2. METHODOLOGY

This research has adopted a quantitative research design with a cross-sectional survey approach and using second generation data analysis that is the PLS-SEM approach.

Instrument; e-activities consist of the quiz, listening assessment, forum, test, and project. The questionnaire consists of the item to evaluate self-efficacy towards effective learning design model.

Data collection; Data collection was conducted for one year. Coursework assessments were conducted throughout the one-semester duration (one cohort) in Semester 1 2018/2019. The MOOC lessons and e-activities were implemented as online learning conducted by the language teachers. All the assessments were conducted via MOOC. This research adopted a quantitative approach for collecting data using a structured survey instrument. A total of 130 questionnaires were distributed to the students enrolled in Mandarin MOOC at public university in Malaysia as case study.

Statistical technique; Partial least squares structural equation modeling (PLS-SEM) was used to perform structural model analysis. PLS was chosen because of the exploratory nature of this study. First, the measurement model (outer model) is tested to ensure its validity and reliability. Measurement properties of multi-item constructs, including convergent validity, discriminant validity, and reliability, are examined by conducting exploratory analysis. The bootstrapping is used to test the significant level construct in this study. The study model included 60 reflective measurement items for 6 variables including independent variables (IV), dependent variable (DV), which constitute 8 relationships between them based on the hypotheses proposed study in the effective learning design model.

3. RESULT AND DISCUSSION

Data analysis and result: The demographic profiles of the respondents revealed that the majority of respondents were male (62.1%) and 36.9% of respondents were female. Table 1 shows the student participation in this study.

Table 1 Student participation

Gender	Number	Percentages (%)
Male	82	62.1
Female	48	39.9
Total	130	100

In SmartPLS, the analysis was undertaken in two stages: i) validating the measurement model (i.e. confirmatory factor analysis CFA) and ii) validating the structural model.

Measurement model: To validate the measurement model (i.e. CFA) in SmartPLS, item loadings, average variance extracted (AVE) and composite reliability (CR) were assessed by running the PLS algorithm. As shown in Figure 2, all the items loadings should be over the recommended value of 0.7 [33]. The author recommended composite reliability values should be greater than 0.7. In this study, all the composite reliability values ranged from 0.934 to 0.964.

The average variance extracted (AVE) measures the variance encapsulated by the indicator relative to measurement error and this should be higher than 0.5 in order to justify the use of construct [33]. In this study, the value AVE ranged from 0.669 to 0.870, which were all within the recommended range. In addition, the discriminant validity of the constructs was measured

using the square root of the average variance extracted (AVE). Overall, the measurement model (i.e. CFA) was assessed and confirmed by examining convergent validity and discriminant validity. Table 2 shows the result for Smarts-PLS Measurement Model Validity Test.

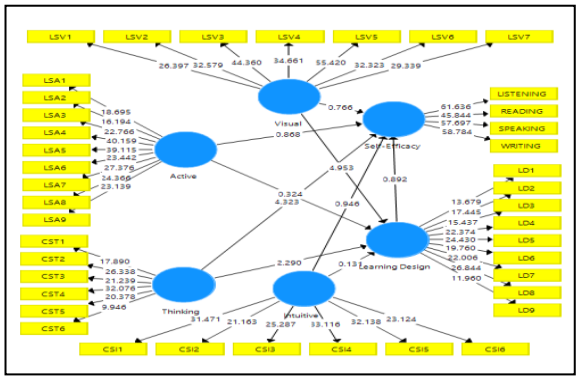

Figure 2: Measurement model in SmartPLS

Table 2 Smarts-PLS Measurement Model Validity Test

Convergent Validity	Discriminant validity
Indicator loadings > 0.70 Composite Reliability (CR) > 0.7 Average Variance Extracted (AVE > 0.5)	AVE > square of inter-construct correlation No substantial cross-loadings

Structural model: To assess the structural model, The average variance extracted (AVE) measures the variance encapsulated by the indicator relative to measurement error and this should be higher than 0.5 in order to justify the use of construct [33]. In this study, the value AVE ranged from 0.669 to 0.870, which were all within the recommended range. In addition, the discriminant validity of the constructs was measured using the square root of the average variance extracted (AVE). Overall, the measurement model (i.e. CFA) was assessed and confirmed by examining convergent validity and discriminant validity. Table 2 shows the result for Smarts-PLS Measurement Model Validity Test.

Table 3 Summary of the structural model analysis

Hypothesis		P Value	Result
H_1	Visual -> Self-efficacy	0.433	Not supported
H_2	Visual -> Learning Design	0.000	Supported
H_3	Active -> Self-efficacy	0.396	Not supported
H_4	Active -> Learning Design	0.765	Not supported
H_5	Thinking -> Self-efficacy	0.000	Supported
H_6	Thinking -> Learning Design	0.026	Supported
H_7	Intuitive -> Self-efficacy	0.334	Not supported
H_8	Intuitive -> Learning Design	0.894	Not supported
H_9	Learning Design -> Self-efficacy	0.361	Not supported

4. CONCLUSION

This study presents findings on the implementation of an online learning approach in learning a second language. The findings show nine hypotheses, three hypotheses supported the P value (significant) and six hypotheses not supported. The findings show that visual and thinking dimensions contribute to the effective learning design model that shows improvement in student performance for all language skills: listening, speaking, reading and writing ($p < 0.01$). This result shows the relationships between learner characteristics and student performance using learning design model through activities in second language courses. In the future, we will further analyze the student performance after using learning design MOOC assessment model.

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This research is conducted by Pervasive Computing & Educational Technology Research Group, C-ACT, Universiti Teknikal Malaysia Melaka (UTeM), and supported by Ministry of Science, Technology & Innovation FRGS grant: FRGS/1/2016/ICT01/FTMK-CACT/F00327.

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Transforming assessment design and recognition of competency-based skill sets in biosciences graduates

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Keywords: Assessments, skill-based competencies, digital credentials, employment and competencies, and metacognitive skills.

ABSTRACT – Incorporating diverse assessments that evaluate students' knowledge and understanding as well as their competencies in discipline-specific practical work skills is essential in ensuring professional competence in that subject area. Hence, a systematic approach that documents the assessments of prior experiential learning including knowledge and skills would determine the extent to which the student has achieved the desired learning outcomes. This innovation describes the transformative approach in assessments design and recognition of specialized skills-based competencies in biosciences graduates through blockchain credentials. Acknowledging students' achievement of discipline-specific subjects learning outcomes that documents assessment learning evidences would assist future employers in evaluating the graduate's level of attainment for these skills-based competencies.

1. INTRODUCTION

There is an emerging use of micro-credentials for certifying attainment of smaller and more specific elements of learning, which is different from the general qualification attested to by a degree. Micro-credentials are being put to several uses that are forcing higher education institutions to think carefully about the value of their traditional assessment and credentialing practice [1].

Micro-credentials provide insight beyond degrees and transcripts. Micro-credentialing is seen by both individuals and higher education providers as a legitimate means of evidencing not only learning or competence credited by other institutions, but also that attained in the workplace or in other forms of informal learning. In addition, micro-credentials can be grouped, aggregated or 'stacked', so learners have flexibility in sourcing learning, and can build their micro-credentials into a larger, and more recognizable, aggregated award [2, 3].

They are evidence of graduate attributes because micro-credentials focus on small, discreet components of learning, they are particularly useful in providing the evidentiary base for graduate attributes typically not referenced in degree transcripts [4, 5]. These attributes include soft skills, specific specialist professional skills

In Taylor's School of Biosciences, Biomedical Science and Biotechnology students should demonstrate a thorough comprehension of broad-based and coherent body of knowledge and be competent in a range of practical skills to conduct guided research, analyze experimental data and draw logical conclusions. In this paper, we describe the assessment design and acknowledgement of specialized skill sets, specifically in the area animal cell culture aseptic technique competencies in biosciences students.

2. METHODOLOGY

Samples; The study was conducted using one cohort of students in the August 2018 semester that have undertaken the module "Genes and Tissue Culture Technology": Comparison was made between March 2018 cohort which consists of 39 students and August 2018 cohort with 31 students. The module "Genes and Tissue Culture Technology" is offered to second year Biomedical Science and Biotechnology undergraduates which introduce animal cell culture technique. Students taking this module will be prepared for future careers in cell tissue culture. Upon completing the module, students are expected to demonstrate techniques in animal cell culture including cell culture maintenance, primary culture, cells cytotoxicity testing as well as the ability to discuss principles and applications of animal cell culture.

Design & Development; A wide range of formative and summative assessments were designed to assess students' attainment of the module learning outcomes. This includes preparation of practical worksheets and full scientific reports as well as completion of hands-on lab skills test and virtual lab simulation activity. The lab skill assessment evaluates individual student based on their aseptic technique in performing animal cell culture experiments while worksheets and reports assess students' ability to analyze and interpret experimental data from cell cytotoxicity testing and draw conclusions. The virtual lab simulation is an activity where students perform animal cell culture experiments in a virtual lab environment, and it incorporates multiple choice questions in between the activity for assessing students understanding on the basic concepts and principles of animal cell culture.

Implementation; Assessments submission and feedback were all conducted online via Taylor's Integrated Moodle e-Learning System (TIMeS). Upon completion of the assessment activities via TIMeS, a digital credential will be awarded to the students. The digital credential was provided by Acrredible, a blockchain technology-based platform, which provide secure and reliable site for capturing students' attainment of the learning outcomes and details of their learning evidences. Students will be able to share this digital credential via online social platforms including Facebook and LinkedIn. LinkedIn is a powerful platform for profiling an individual's education and professional credentials. Students would be able to share their LinkedIn profile which showcase the types of assessments performed and learning evidences when seeking for internship placement/ industrial attachment or for employment upon graduation.

Data Collection Procedure: Data collection was conducted. Coursework assessments were conducted throughout the one semester duration. The practical components and virtual lab simulations were implemented as blended learning activities to support assessment and micro-credentialing.

3. RESULT AND DISCUSSION

Figure 1 shows the percentage of students according to grades for March and August 2018 cohort. Findings showed positive results of students in the August 2018 semester. In August 2018 semester, the average score is 69.42 ± 11.01 marks (grade B range), which is higher than previous semester's (60.17 ± 5.36 marks). The percentage of students obtaining grade A increased to 41.7% in August 2018 cohort compared to the previous semester.

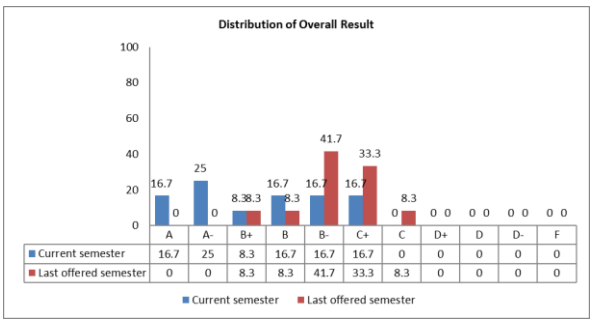

Figure 1: Percentage of students according to grades in August 2018 cohort compared to the previous semester March 2018 cohort.

Figure 2 showed students response after using the Labster virtual lab simulation as part of their assessment learning activities. More than 80% of students responded that quiz questions in the simulation activity in deepening your understanding about the topic, 79.3% of students expressed that the gamified virtual lab simulation made me enjoy the learning process while 75.9% of students felt that they can apply what I learnt in the simulation to real life situation.

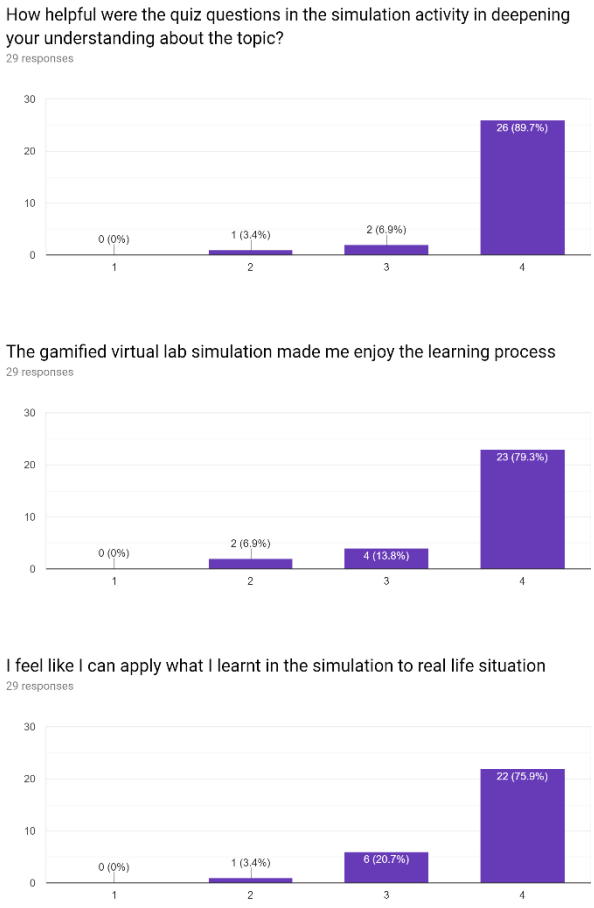

Figure 2 Students response on the use of Labster virtual simulation as part of their assessment learning activities.

Students comments relating to the module teaching and learning as well as assessments were collected every semester (Figure 3). The responses obtained were highly positive (4.8 over 5.0), indicating students have achieved the respective learning outcomes for the module.

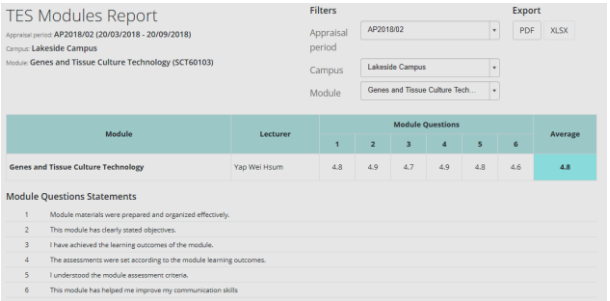

Figure 3 Teaching Engagement Scale: module evaluation report for the module "Genes and Tissue Culture Technology" in Aug 2018 semester

Students completing the assessments were awarded with the digital badge for recognition of completing the formative and summative assessments, and the digital badge could be shared on social media platforms such as LinkedIn (Figure 4).

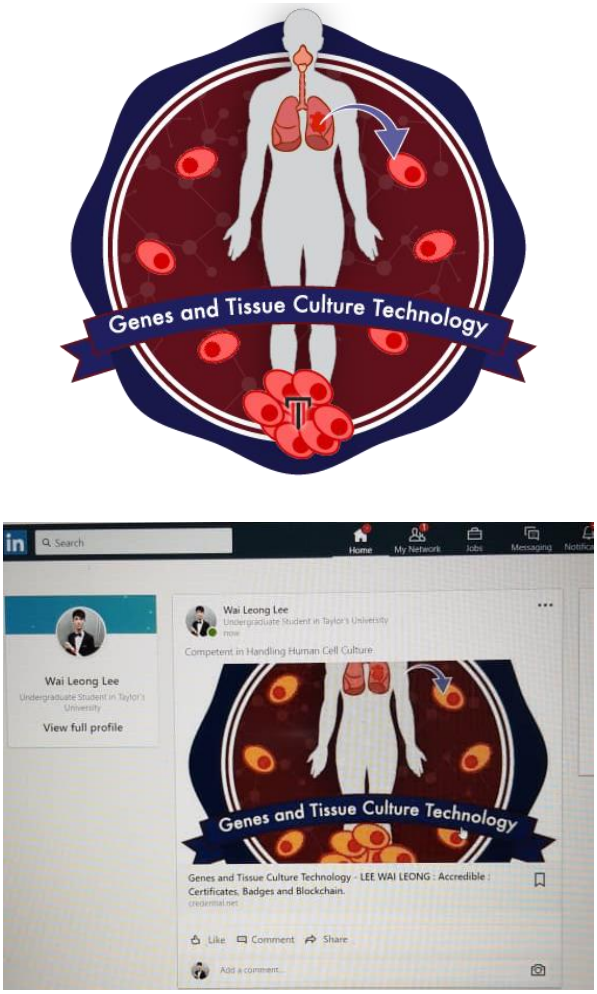

Figure 4 Digital badge awarded to students for recognition of completing the module assessments in "Genes and Tissue Culture Technology". Sharing by student Lee Wai Leong for the digital badge on his social platform LinkedIn.

4. CONCLUSION

This study presents findings on the assessment design and recognition of specific skillsets in biosciences students. This innovation can be applied across other modules in sciences or business-based degrees to project the acknowledgement in attaining the learning outcomes within specialized areas of disciplines and the documentation of the learning evidences on digital platform for potential job employment opportunities.

5. ACKNOWLEDGEMENT

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e-sirah Saidatina Siti Khadijah: The development of mobile apps for hearing-impaired students towards Education 4.0

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Keywords: Saidatina Siti Khadijah, hearing problems, storylines, quizzes

ABSTRACT – Teaching and learning for hearing-impaired students requires theories and strategies that are relevant to developments in terms of their thinking skills in education 4.0 era. This is because the learning and motivation skills can produce effective and efficient output. E-Sirah Saidatina Siti Khadijah application for hearing-impaired students is aim to help students who have hearing problems so that they can understand the storyline about one of Rasulullah's wives, Saidatina Siti Khadijah binti Khuwalid RA. The application can attract those who have hearing problems to use this app by development with multimedia applications contain certain elements, especially animated elements. For value added to this approach, we add several quizzes that are produced to assess the students understanding. This app is expected to inculcate moral values in children to give them exposure on an Islamic exemplary story that can be used as a lesson in the future.

1. INTRODUCTION

In this new edge period, information and correspondence innovation is significant in the life of society. Information and correspondence innovation is the innovation used to aid the conveyance of information, for example, TV, radio, web, PCs and phone. In accordance with the fast advancement of information and correspondence innovation, it has given a great deal of positive effects to the field of industry including instruction. Notwithstanding, a large portion of the story models are not displayed as the innovation advances. The majority of these accounts are just in straightforward books or applications yet don't give favourable learning strategies.

Teaching and facilitation for understudies with hearing problem requires learning speculations and systems that are important to improvements as far as their reasoning aptitudes. This is on the grounds that the learning and inspiration abilities can deliver viable and effective yield. The E-Sirah Saidatina Siti Khadijah application was created to help understudies who have hearing issues with the goal that they can comprehend the account of one of Rasulullah's better half, Saidatina Siti Khadijah binti Khuwalid RA. This application applies moral qualities in youngsters to give them presentation on an Islamic excellent story that can serve as a lesson in the future.

Created Multimedia applications contain certain components, particularly energized components so they can draw in the individuals who have hearing issues to utilize this application. Investigation in this application is made so as to build up an innovation based training field and address any issues that apply in the utilization of educating and encouraging procedures. Kids will likewise better comprehend the storyline. In this manner, toward the finish of the sight and sound application created, there are a few tests that are delivered to survey the understudies' understanding.

2. LITERATURE REVIEW

Hearing misfortune makes an individual become unusually occupied with daily activities. They become disengaged as a result of what is said to be less comprehended and liable to be confused. Hearing inabilities are people who cannot unmistakably hear both ears without utilizing amplifiers or cannot hear straightforwardly even by utilizing portable amplifiers. In other words, listening sense cannot work as ordinary human typical hearing. Degree of hearing loss can be determined from several causes. [1]

Some of the signs or symptoms of hearing problems are that they cannot hear the instructions, cannot communicate with the people around, hear the sounds in the ear (tinitus), do not turn to the source of the sound, often ask the speakers to repeat what is being said, showing signs of error, do not understand speech and more. Hearing problems with an individual are likely to occur from genetics or since birth have been confirmed to have hearing problems and can be postnatal due to certain factors including accidents or other illnesses. [2]

Hearing loss has varying degrees of low, medium, severe and very severe. Hearing severe is also known as deaf. Hearing loss levels are divided into four levels [2]:

Table 1: Decibel degree of hearing impact

Categories	Decibel Degree	Hearing Impact
Mild	25 - 29	hard to hear the noise in the area
Moderate	40 - 69	hard to hear a whisper
Severe	70 – 89	Difficult to

		understand a strong voice
Profound	90 >	Do not understand a strong voice or scream

The development of technology in parallel with the development of Malaysian civilization has formed a part of technology that helps these hearing-impaired people. The development of the technology and telecommunications world as well as the Multimedia Super Corridor (MSC venture has set Malaysia in a worldwide relationship among the world's leading nations [3]. Different endeavors have been embraced to boost the utilization of technology in transforming the Malaysian society into the knowledge based society. Thus advances in technology such as internet and multimedia are so prominent in the public sector as well as in the private sector [4].

"The power of the web lies in the universal aspect. It can be achieved by all people, even with physical deficiencies". World Wide Web Consortium (W3C) director, Tim Berners-Lee said when speaking about internet and the disabled [5]. The use of technology has grown rapidly in many aspects of society and it should be used by all levels of society including those with physical deficiencies or disabilities such as sight, hearing, limb disabilities and others [6]. This allows the hearing-impaired people to communicate with the hearing and vice versa without any difficulties. In addition, this technology also facilitates the exchange of information for mutual benefit [7]. In Malaysia, hearing-impaired people are no exception from being impressed with the development of current technology. This allows them to utilize the technology for their own use and thus contribute to the benefit of the general public [8].

3. METHODOLOGY

In the development of E-Sirah Saidatina Siti Khadijah application for hearing-impaired students, the procedure utilized is the ADDIE model. ADDIE's approach covers the five fundamental stages, specifically the period of analysis, the design phase, the development phase, the implementation phase and the evaluation phase [9].

The analysis intends to look and examine each of the necessities in the development of a decent application and anticipate the design of the early painting of the project's development flows. We've found an existing app on the Google Play Store platform to focus on text-only elements. Therefore, we have developed an application that combines multimedia elements of animation, text, audio and graphics.

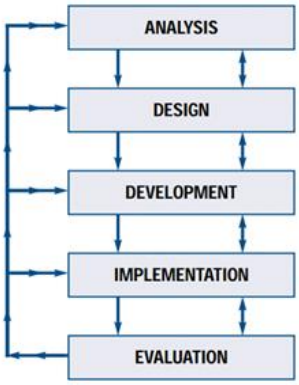

Figure 1: ADDIE model development

In design development, designs such as conceptual model, riddles and storyboards will be produced to be a reference and assist in the process of developing the project in the next phase. Application description is also provided in the form of ideas and concepts that are effectively comprehended by users about how this application is developed.

Figure 2: Main page interface of application

Figure 3: Quiz interface

We utilized Adobe Illustrator CC 2018 and Adobe Animate CC 2018 for the development of application. The decision of software and hardware is appropriate for the project to be developed can enable the undertaking to run easily. Phase checks during this phase of development need to be done as such that no errors and shortcomings occur on the interface.

Testing on app effectiveness are rushed to guarantee that the application runs correctly accurately the

oversight and weakness of a component. After the application is successfully developed, the application will be tested for its effectiveness. This E-Sirah App is tested by 3rd year elementary students and teachers to assess the entire application from different perspectives

The evaluation phase refers to the software testing and evaluation process developed to ensure the appropriate content, graphics, audio, video and software interface. It likewise includes only specific testing designs that require user feedback such as content, strategies and multimedia elements through interviews, questionnaires, supervisory and testing methods.

4. RESULT AND DISCUSSION

Surveys have been conducted at SK Panjang Sari, Pagoh, Muar by 31 respondents from among the students and 4 respondents from the teachers have answered the questionnaire [10]. Table 1 shows the result from respondents (students) and Table 2, the result from respondents (teachers).

Table 2: the results from respondents (students)

Scale / Questions	1	2	3	4	5
1	0%	0%	3.2%	0%	96.8%
2	0%	0%	0%	6.5%	93.5%
3	0%	0%	0%	16.1%	83.9%
4	0%	0%	0%	9.7%	90.3%
5	3.2%	3.2%	0%	19.4%	74.2%
6	0%	0%	12.9%	9.7%	77.4%
7	0%	0%	0%	12.9%	87.1%
8	0%	3.2%	6.5%	12.9%	77.4%
9	0%	0%	0%	22.6%	77.4%
10	0%	3.2%	3.2%	0%	93.6%
Average	**0.3%**	**1.0%**	**2.6%**	**11.0%**	**85.16%**

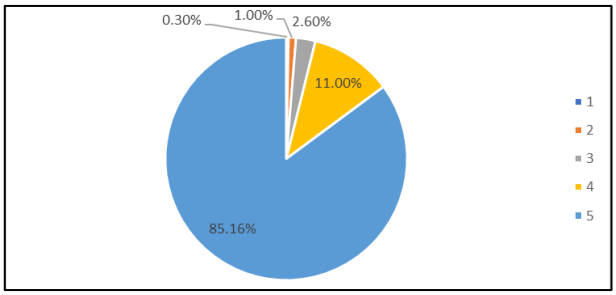

Figure 4: Average from respondents (students)

Figure 4 shows the average from students. According to the result, there are 85.16% of students strongly agree that this application gives them a positive feedback. Teaching and learning using the apps tends to built-up their knowledge and skills in remembering the storyline. This is on the grounds that they didn't know the genuine anecdote about Saidatina Siti Khadijah previously. They truly love the fascinating interface with relaxed and light storyline Moreover, they are very acquainted with the apps cause of the robust technology of tools and equipment's.

Table 3: the results from respondents (teachers)

Scale / Questions	1	2	3	4	5
1	0%	0%	25%	75%	0%
2	0%	0%	25%	75%	0%
3	0%	0%	0%	100%	0%
4	0%	0%	75%	25%	0%
5	0%	0%	0%	100%	0%
6	0%	0%	0%	100%	0%
7	0%	0%	50%	50%	0%
8	0%	0%	50%	50%	0%
9	0%	0%	75%	25%	0%
10	0%	0%	25%	75%	0%
11	0%	0%	25%	75%	0%
12	0%	25%	0%	75%	0%
13	0%	0%	25%	75%	0%
14	0%	0%	25%	75%	0%
15	0%	0%	25%	75%	0%
16	0%	25%	50%	25%	0%
17	0%	0%	100%	0%	0%
18	0%	0%	25%	75%	0%
19	0%	25%	75%	0%	0%
20	0%	0%	50%	50%	0%
Average	**0%**	**3.8%**	**36.3%**	**60%**	**0%**

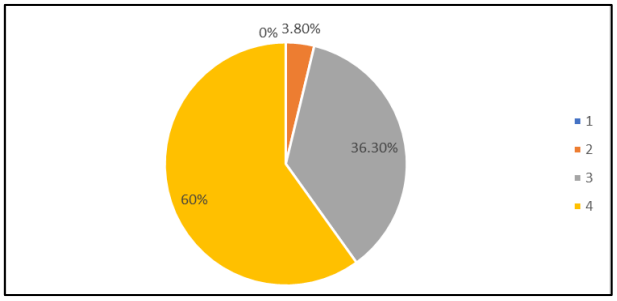

Figure 5: Average respondents (teachers)

According to Figure 5, the average of respondents from the teacher shows that 60% of them agree with the development of apps. They accept the flow of the storyline in the apps which is interesting and interactivity. Meanwhile, 36.30% fairly agree with the development of apps. They can figure out the storyline and pursue every scene of the apps. These result also accept that the apps can be used during teaching and facilitation.

5. CONCLUSION

This study presents findings on the implementation of e-sirah application. Analysis using 31 potential respondents from students and 4 respondents from teachers was conducted. The findings show that students using e-sirah application have better performance in their knowledge's and skills of remembering the storyline. In future, we will further analyze the effectiveness attributes of e-sirah application with other sirah's story.

In conclusion, interactive technology use is expected to nurture pure values in children through

Islamic conceptual storytelling. Children can feel the fun and interactive learning environment.the management of a project is important to achieve the objectives of the project. Research and implementation are also important for the development of a quality, organized and organized application Therefore, we hope that the application we develop can attract users to better understand the stories of other Islamic example stories.

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Interactive Book, THeAR as E-Learning Tools in Augmented Reality

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Keywords: AR integration, Teaching and Learning, Interactive Book, Technology Effectiveness

ABSTRACT – One of the methods of teaching that has brought significant contributions to the field of education is augmented reality. This technology transformed learning into a more motivating, enjoyable, fun, and interesting activity. This research contributes an augmented reality application for mobile devices that complements and supports the learning of Toxic &Hazardous Waste Management. The Interactive Books, called *THeAR*, consists of a reference book and software capable of reading special markers inserted into the book's content. When this book is placed in front of the camera of a mobile device, 3D objects, sounds, animations, and other interactive elements leap from book pages making learning more fun and exciting. Preliminary tests on effectiveness of AR integration in Interactive Book for student's learning were made with students and showed good acceptance of the application to support the teaching and learning of Toxic & Hazardous Waste Management.

1. INTRODUCTION

In this 21st century, the term "technology" is an important issue in many fields including education. This is because technology has become the knowledge transfer highway in most countries. Technology integration nowadays has gone through innovations and transformed our societies that has totally changed the way people think, work and live [3]. As part of this, schools and other educational institutions which are supposed to prepare students to live in "a knowledge society" need to consider ICT integration in their curriculum [4]. As pointed out by Su, in the new education in the era of the knowledge-based economy, basic capabilities such as innovation, problem solving, critical thinking and the ability to apply information technology, are all important for future citizens.

Creativity is the creative flame of innovation. Thus, creativity education has become the essence of future education. Developing talents in creativity has become an important goal of educational reform and economic development for all countries in the world. When challenged by global competition, innovation is an assurance to enhance competitiveness, and creativity/ innovation can be greatly cultivated through education. It defined the role of creativity in educational reform as making an all-out effort to promote creativity education. It proclaimed its commitment to creativity education as the focus of educational reform in the future. Thus, to enable students to be creative, teaching must be innovative and creative so as to improve the learner's innovative capability. Thus, teaching innovation was the top priority mission. School teaching must adjust to the need of social development, replacing teaching modes that are too rigid with modern means of teaching, interactive teaching methods and customised teaching content to develop the learners' innovative spirit and capabilities, so that they are able to think independently when faced with problems and make judgments to solve them (enabling them to possess portable skills).

Augmented reality (AR) as an emerging technology in the mobile computing domain is becoming mature enough to engender publicly available applications for end users. Technology affordances affect instructional design and the manner of teaching. Aside from the content, the technological media (such as computers) have affordances which change the learning experience. Thus, it is important to study the effects of integrating technology in educational settings, and how such technologies can be maximized to improve learning. Augmented reality is a field in which 3D virtual objects are integrated into a 3D real environment in real time [10]. Since then according to recent advancements in Augmented Reality a new definition emerged which was again proposed by Azuma et al. according to which, an AR system supplements the real world with virtual (computer-generated) objects that appear to coexist in the same space as the real world.

Student Inquiry and Student-Generated Representations

Students' use of multimedia when learning science, example through making unseen processes visible, is also highlighted in the research literature pertaining to ICT in science education in general [9]. Simulations and animations are in particular considered to support learning if encouraging what-if questions [8]. An inquiry-based approach is highlighted as central when learning science [15], and [8] positively emphasize technology that supports students in the collection, organization, and analysis of data, and the development of scientific explanations connected to this. Looking forward, they call for learning technology to be used by teachers to support students' situated inquiries in real world contexts, referring to the five learning principles of (1) active construction, (2) situated learning, (3) cognitive tools, (4) reference to learning goals and (5) scaffolding to support students in completing challenging tasks [9]. Thus, the traditional view of exemplary scientific practice being students' hands-on experiments in the science lab is

contemporarily being broadened to include simulation and animation as mediating tools [8]. Most importantly, the value of students being active producers when working with simulations and animations is increasingly being highlighted in the research literature. Students' conceptual gains and greater engagement have been emphasized in research examining contexts where teachers are guiding students in generating their own representations [16]. It seems that students' engagement with sciences content is encouraged if they are asked to explain and communicate their knowledge to others, especially if they have ownership in the process and use their own devices combining digital media forms (Hoban et al., 2013). In sum, although AR can appeal to all senses, the visual augmentation and visualization of abstract and complex science concepts and phenomena is in particular highlighted in extant literature. Furthermore, AR allows users to be immersed in the simulations, easily collaborating with peers when discussing complex 3D phenomena that would be difficult to comprehend through other media. In the pertinent literature, there is a call for gaining greater knowledge about educational use of AR being generated close to the educational context, including guidelines supporting teachers in promoting student learning. In response to this need, the ambitious aim is to develop a framework to enable teachers and students to become AR producers, closely connected to the science content they are working with in everyday science lessons and to base this framework on inputs from the broad range of experts acting in this rapidly developing field.

2. METHODOLOGY

Research Design; In this research, quantitative methodology was used to collect and analyze the data obtained from all the respondents. The researchers developed the questionnaire and finalized it before being distributed to the targeted group of respondents. Few sections on the questionnaire were designed specifically to address research objectives in regard with the **e**ffectiveness of AR integration in Interactive Book for student's learning and effective elements in ICT for AR integration learning in Institutional in Toxic & Hazardous Courses. Therefore, the questionnaire was distributed to obtain the data from the respondents.

Population and Sampling; The overall total of respondents for this research was 101 students from Polytechnic students which took Toxic & Hazardous Courses. The questionnaire was randomly distributed to the respondents regardless of gender, race, and preference of learning style as well as the ability of handling ICT in learning. There are no preferences set by the researchers as long as the respondents come with environmental engineering background. Since the targeted respondents for this research are meant for students with environmental engineering background, the researchers tried to get especially students from Polytechnic Sultan Idris Shah which took the courses of Toxic & Hazardous Waste Management to be part of this research.

Instrument; A survey questionnaire with a total of 20 items was used as the main instrument in this study to analyze the effectiveness of AR integration in learning by using Interactive Book in Toxic & Hazardous courses. A total of 101 questionnaires were distributed where all respondents were asked to read the statements given and choose their answers based on 4-Likert scale ranged from 4= Strongly Disagree, 3= Disagree, 2= Agree and 1= Strongly Agree. The questionnaires consisted of 3 sections. Section A is about the demographic background of the respondents consists of 6 items that includes gender, race, age, preference of learning style, the ability of handling ICT in learning, and the frequent on assessing ICT. The other 2 sections in the questionnaire which were section B consists of 10 items that looks into the effectiveness of AR integration in Interactive Book for student's learning meanwhile section C comes with 10 items that looks into the effective elements in ICT integration for AR learning in institutional. The questionnaire used for this quantitative study was adopted and modified from the original questionnaire [5], which is considered suitable for this research. Some of the items are designed and developed by the researchers accordingly with the title chosen so that the items developed are able to provide the answers needed for both research questions.

Data Collection Procedure: Data collection was conducted for one year. Coursework assessments were conducted throughout the one semester duration for each cohort. The MOOC lessons and e-activities were implemented as a blended learning to support the face-to-face learning conducted by the language teachers. Some of the assessments were conducted via face-to-face and some of it via MOOC.

Data Analysis Process: The data analysis was performed using The Statistical Package for Social Sciences for Windows (SPSS, v20.0). The Cronbach's alpha test was firstly applied to evaluate the reliability of the likert-type scale questions with the aim of ensuring each question under a variable are all measuring the same underlying attributes. Descriptive statistics (frequencies) were used to describe sociodemography of respondents. Cronbach's alpha is widely used in the social sciences which measures the degree consistency of the responses obtained. It's described how much each item is associated with another in the split-half reliability test. Cronbach's is related conceptually to the Spearman–Brown prediction formula. The theoretical value of alpha varies from zero to 1, since it is the ratio of two variances. However, depending on the estimation procedure used, estimates of alpha can take on any value less than or equal to 1, including negative values, although only positive values make sense. Higher values of alpha are more desirable. Cronbach's alpha coefficient is a measure of squared correlation between observed scores and true scores.

The reliability is measured in terms of the ratio of true score variance to observe score variance. A reliability coefficient of greater than 0.7 indicated that the measure has achieved acceptable reliability. Reliability coefficients of the questionnaires were tested for six

independent factors.

3. RESULT AND DISCUSSION

Table 1: Demographic of Sample

Factors	Frequency	Percentage (%)
Gender		
Female	65	64.35
Male	36	35.61
Race		
Malay	85	84.15
Indian	10	9.9
Chinese	2	1.98
Others	4	3.96
Age		
18 till 20 yrs.	94	93%
21 till 22 yrs.	7	7%
23 till 24 yrs.	0	0
>25 yrs.	0	0
Preference Of Learning Style		
Conventional/ Traditional	42	41.58
Modern/ Contemporary (Use of ICT)	59	58.42
The Ability Of Handling ICT In Learning		
High	25	24.75
Medium	67	66.34
Low	9	8.91
Respondent Thinks That ICT is useful for Their Learning		
Yes	80	79.2
No	3	2.97
Not Sure	18	17.8

From the overall population (n=101) based on gender, there are 65 female respondents with a percentage of 64.35% as compared to only 36 male respondents with 35.61%. From the overall population based on race, the highest frequency of respondents are Malay with a total 85 (84.15%) followed by Indian with 10 (9.9%), then Chinese with 2 (1.98%) and also others with 4 (3.96%) specified as 1 Dusun, 2 Iban and 1 Melanau whom referred as an Ethnic race in Sabah and Sarawak. From the overall population based on age, most of the respondents at age 18 till 20 years, because there were in between semester 2-4.

From the overall population based on preference of learning style, more respondents preferred modern/contemporary teaching style with 59 (58.42%) as compared to respondents who preferred conventional/traditional method of teaching with 42 (41.58%). Approximately, 67 (66.34%) of respondents believe that they possess medium ability in handling ICT in their learning or study. Indeed, 80 (79.2%) respondents thinks that ICT is useful for their learning, compared with 18% declared that not sure either ICT is useful or not in their learning.

Effectiveness of Technology-based (AR) in Teaching and Learning for Students

The results obtained from Table 1 that would want to examine the effectiveness of ICT, Augmented Reality integration for students in learning shows that the use of ICT promotes active and engaging lesson for students' best learning experience with recorded of the lowest mean score of 1.67. In the previous section, most teachers agreed that the use of ICT enables the students to be more active and engaging in the lesson. This shows that both teachers and students agreed that the use of ICT provide the chances for students to be active and take more parts or roles for their best learning experience.

The use of ICT also helps to broaden student's knowledge paradigm with mean score of 1.69 where students are able to integrate their prior knowledge into the current learning systems as well as sharing and exchanging point of view with the teachers and classmates. ICT helps to provide latest and current issues where students can obtain it very easily and integrate it into their learning process. Besides, ICT helps students to learn more effectively as well as it helps students to find related knowledge and information for learning with shared mean of 1.71. The technology always acts as a medium for students to find related knowledge and information for their learning. It is best when the students are able to gather information, relate it back with what they have learnt and have a discussion on the information with lecturers and their students so that they can see the relation of what is new and what the latest issues they need to catch up for effective learning.

Other than that, there a lot of educational videos provided for students online which it helps to improve student's ability in learning skills such as reading, writing, listening and speaking with total mean of 1.72. It is good for students to watch videos and learn from it so they can gather the confidence needed when it comes to argumentative issues in the classroom where they are able to provide clear clarification and their judgments on certain issues. The use of ICT which means AR also allows students to be more creative and imaginative with mean score of 1.80 followed by their ability to express their ideas and thoughts better with mean of 1.81. This shows that the use of ICT enhances students thinking and enables them to think out of the box and make the best use of their learning process.

Table 2. Effectiveness of AR integration in Interactive Book for student's learning

NO	ITEMS	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	MEAN	S.D
		Frequency and Percentage (%)					
1.	AR allows students' to be more creative and imaginative.	1 (1%)	7 (6.9%)	64 (63.4%)	29 (28.7%)	1.80	.60
2.	The use of AR helps students to find related knowledge and information for learning.	1 (1%)	4 (4%)	61 (60.4%)	35 (34.7%)	1.71	.59
3.	The use of AR encourages students to communicate more with their classmates.	11 (10.9%)	0	63 (62.4%)	27 (26.7%)	1.84	.60

4	The use of AR increases students' confidence to participate actively in the class.	10 (9.9%)	0	65 (64.4%)	26 (25.7%)	1.84	.58
5.	I think students learn more effectively with the use of AR in Interactive Book	6 (5.9%)	0	60 (59.4%)	35 (34.7%)	1.71	.57
6.	I think the use of ICT helps to broaden students' knowledge paradigm.	8 (7.9%)	0	54 (53.5%)	39 (38.6%)	1.69	.61
7.	I think the use of ICT (AR) helps to improve students' ability specifically in reading, writing.	10 (9.9%)	0	53 (52.5%)	38 (37.6%)	1.72	.63
8.	The students' are more behaved and under control with the use of Interactive Book (AR)	2 (2%)	16 (15.8%)	51 (50.5%)	32 (31.7%)	1.88	.74
9.	The use of AR enables students' to express their ideas and thoughts better.	3 (3%)	13 (12.9%)	47 (46.5%)	38 (37.6%)	1.81	.77
10.	The use of AR promotes active and engaging lesson for students' best learning experience.	1 (1%)	6 (5.9%)	53 (52.5%)	41 (40.6%)	1.67	.63

The result shows that the effectiveness of Augmented Reality for students in learning courses of Toxic Hazardous Waste Management Interactive Book are it encourages students to communicate more with their classmates as well as it increase the students confidence to participate actively in the class with shared mean of 1.84. It is effective in a sense that students are occupied with adequate knowledge that enables them to be more confident in sharing and exchanging their opinion with their classmates. Lastly, it shows that students are more behaved and under control with the use of ICT in learning but it is also considered as fewer acceptances by teachers as the score mean is the highest of all with 1.88. This might give the ideas to teachers that students are a little bit out of control when ICT is used in teaching as teachers are not the main focus of learning process.

Effective Elements in Technology-based Teaching and Learning in PSIS

From the data obtained, it shows that learning time are not enough for students to use the ICT in teaching and learning purposes with score mean of 1.97. It means there is no unhurried times provides for students so that they can at least use AR for effective learning process. It is good if students are given more time to teach so that AR integration in learning can be a success. Most students agreed that all ICT tools provided for their institutional goes to waste with mean of 1.98 due to some students lack of knowledge and skills in using it. Sometimes, ICT facilities are completely provided but little access to ICT prevents students from using it in learning with score mean of 2.02.

Some students feels the urge and motivated to use ICT in learning but there is lack of supports from the institutional top management that hinder and discourage them from using ICT with mean of 2.08. The institutional top management must provide an encouragement for students to use ICT in teaching learning and convince them that ICT can benefits both teaching and learning process. Besides, students are given the freedom they need to their own learning method with the helps they received from ICT with a total mean of 2.75. Some institutional are not provided with at least computer laboratory in which students will get the chances to integrate the use of AR in their learning process that shown mean score of 2.79. Students must be given the freedom to study with their own learning methods and make full use of ICT but they must be remembered to keep it in track with the curriculum designed.

Table 3: Effective elements in ICT for AR integration learning in Institutional

NO	ITEMS	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	MEAN	S.D
		Frequency and Percentage (%)					
1	The ICT facilities in my institutional are well-functioning and can be used.	34 (33.7%)	36 (35.6%)	22 (21.8%)	9 (8.9%)	2.94	0.96
2	The technical supports are provided if students are faced with difficulties.	29 (28.7%)	36 (35.6%)	26 (25.7%)	10 (9.9%)	2.83	0.96
3	Little access to ICT prevents me from using it in learning.	3 (3%)	16 (15.8%)	62 (61.4%)	20 (19.8%)	2.02	0.69
4	Lack of supports from the institutional top management discourages me from using ICT.	6 (5.9%)	20 (19.8%)	51 (50.5%)	24 (23.8%)	2.08	0.82
5	Learning time are not enough for me to use the ICT for learning purposes.	1 (1%)	21 (20.8%)	53 (52.5%)	26 (25.7%)	1.97	0.71
6	Student is good enough practices about AR use in learning.	19 (18.8%)	57 (56.4%)	17 (16.8%)	8 (7.9%)	2.86	0.81
7	All ICT tools in my institutional go to waste and less used by students.	6 (5.9%)	21 (20.8%)	39 (38.6%)	35 (34.7%)	1.98	0.89
8	Students are given more time to learn and be comfortable with the use of ICT in teaching.	25 (24.8%)	55 (54.5%)	17 (16.8%)	4 (4%)	3.00	0.76
9	There is computer lab in my institutional in which I can watch educational videos.	28 (27.7%)	34 (33.7%)	29 (28.7%)	10 (9.9%)	2.79	0.96
10	Students are given the freedom they need to their own learning method with the helps they received from ICT	26 (25.7%)	33 (32.7%)	33 (32.7%)	9 (8.9%)	2.75	0.94

Technical supports if students are faced with difficulties as well as learning and training development are less provided for student about ICT use in learning method with the score mean of 2.83 and 2.86 respectively. The institutional top management must find ways to provide enough technical supports as well as learning and training development for students in order to ensure success implementation of AR in teaching. Other than that, ICT facilities provided in institutional are not well functioning and in not a good condition as it is not being used by students with the mean of 2.94 and there is less maintenance to make sure the facilities are

well taken care of by the institutional management.

Finally, the worst findings shows that students are less given enough time to learn and to be comfortable with the use of ICT in learning with the highest mean recorded at 3.00. It is better if students are given time to learn and be comfortable with AR in ICT for them to explore its use and make the best use of it. The overall findings shows that there is none effective elements identified from the data collected regarding the effective elements of ICT integration in teaching and learning in institutional in Polytechnic Sultan Idris Shah. However, the researchers made up of some suggestions and recommendations for students and institutional top management to cater to this issue found from the research conducted towards students.

Reliability Testing

The Cronbach's Alpha reliability testing is used to test the internal consistency of an instrument and its items. It is also considered as a measurement for scale reliability. For this study, the scale used is Likert scale ranged from 4= strongly disagree, 3= disagree, 2= agree and 1= strongly agree. According to Kline (1999), the most generally accepted value of alpha value is something greater than 0.7 and alpha value greater than 0.6 is ranged acceptable. For this research, reliability test is done accordingly by section that includes in section B, C and D of the questionnaire.

In Table 4, the reliability shows the result of alpha value are more than 0.7 which it shows good and satisfactory reliability of the items and accepted as research instruments to the respondents.

Table 4: The reliability test for the effectiveness of AR integration in learning

No of Items	Cronbach's Alpha
10	0.87

Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. AR allows students' to be more creative and imaginative.	0.61	0.86
2. The use of AR helps students to find related knowledge and information for learning.	0.49	0.87
3. The use of AR encourages students to communicate more with their classmates.	0.61	0.86
4. The implementation of AR increases students' confidence to participate actively in the class.	0.59	0.86
5. I think students learn more effectively with the use of AR.	0.53	0.87
6. I think the use of AR helps to broaden students' knowledge paradigm.	0.55	0.86
7. I think the use of AR helps to improve students' ability in understanding the courses.	0.63	0.86
8. The students' are more behaved and under control with the use of AR.	0.60	0.86
9. The use of AR enables students' to express their ideas and thoughts better.	0.73	0.85
10. The use of AR promotes active and engaging lesson for students' best learning experience.	0.60	0.86

As presented in Table 5, the reliability test shows the result of alpha value greater than 0.6 which means that the items are acceptable and it can be considered as an instrument for the respondents. However, the researcher can take note of this and improvise the items in order to increase the alpha value and make it more reliable as an instrument.

Table 5: The reliability test for the effective elements of ICT for AR integration in learning

No of Items	Cronbach's Alpha
10	0.63

Item	Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. The ICT facilities in my institutional are well-functioning and can be used.	0.54	0.54
2. The technical supports are provided if students are faced with difficulties.	0.59	0.53
3. Little access to ICT prevents me from using it in learning.	0.05	0.65
4. Lack of supports from the institutional top management discourages me from using ICT.	0.01	0.66
5. Learning time are not enough for me to use the ICT for learning purposes.	-0.08	0.67
6. Student is good enough practices about AR use in learning.	0.60	0.54
7. All ICT tools in my institutional go to waste and less used by students.	-0.17	0.70
8. Students are given more time to learn and be comfortable with the use of ICT in teaching.	0.59	0.55
9. There is computer lab in my institutional in which I can watch educational videos.	0.44	0.57
10. Students are given the freedom they need to their own learning method with the helps they received from ICT	0.50	0.55

4. DISCUSSION & CONCLUSION

The results of this study show that technology-based learning and teaching is more effective in compare to traditional. This is because, by using ICT tools and equipment for example AR integration will prepare an active learning environment that is more interesting and effective for both lecturers and students. The results are in line with a research findings [12] that proved using ICT in education would enhance students' learning. However, most of students in this study agree that ICT helps to improve understanding and also well-behaved and more focused because the attractive elements in augmented reality. Moreover, this study proved that students learn more effectively with the use of ICT as lesson designed are more engaging and interesting. Accordingly, the participants agreed that integrating ICT can foster students' learning.

Results of a study [20] show that the Internet Use in EFL Teaching and Learning in Northwest China and the findings indicated that students have positive attitude regarding the use of Internet in teaching and learning; students have some knowledge about Internet use in learning; they have not well integrated Internet into teaching and learning so far; students' knowledge about ICT and network technology is very limited. For findings of this research, most of students think that ICT integration in learning is effective. Because students can develop the confidence to have better communication and able to express their thoughts and ideas; ICT helps students to be more creative and imaginative as their

knowledge paradigm expend; and ICT helps students to possess all four skills in learning when they are able to acquire necessary information and knowledge. However, this study finds institutional are not given enough time to learn and be comfortable with ICT.

In this study found that most respondents think ICT integration is effective, but ICT tools provided in institutional are not enough nor in good condition; training and professional development are not adequately provided; technical supports are somehow provided but can be improved from time to time; and not very good condition of computer lab in institutional with well-functioning tools and facilities.

In conclusion, the very first stage of ICT implementation must be effective to make sure that, lecturers and students are able to make the best use of it. Thus, preparations of a technology-based teaching and learning begin with proper implementation and supports by the institutional management. If the implementation process of technology integration in institutional take place appropriately from the very beginning stage and the continuous maintenance are adequately provided, ICT integration will result in a huge success and benefits for both lecturers and students. The use of ICT especially in teaching and learning is more about practicality as compared to theories and that is why both lecturers and students must be given time to learn and explore it, face the "trial-and-error" phase before they are completely comfortable with its usage and able to make use of it for teaching and learning.

Finally, the integration of ICT in teaching and learning needs serious consideration in order to increase the competency of the country's education system. This will help in increasing the world ranking of the national education and produce the better future work force. The changes that is taking place is driven by advanced technology and communication devices that should be available to students wherever they are either at school or home. In addition , the needs for students to be literate and have good skills and knowledge in using ICT to improve their learning methods and approach is desired to improve and explore effective learning as well as to meet the demand of the 21st century innovative skills.

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MOOC 4.0 Dashboard: A Massive Open Online Course (MOOC) Content Development and Project Management Tool

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Keywords: MOOC, motivation, dashboard, content development, project management

ABSTRACT – MOOC 4.0 Dashboard is an electronic interface that aggregates and visualizes data from multiple sources. The dashboard assists the MOOCs content developer in content design and development and the project manager to monitor MOOCs project progress and performance by displaying current status, actionable data, and real-time information. The development of MOOC 4.0 Dashboard is guided by the Keller's ARCS Model of Motivation and Web Development Model which leads to a systematic process in designing and developing quality and sustainable MOOC.

1. INTRODUCTION

Massive open online courses (MOOCs) are large-scale online classes that are developed by higher educational institutions as a platform for students and instructors to engage in active-learning [1]. It provides another educational offering for those who are looking for complementary education and training by allowing the acquisition of new knowledge and skills in fields that could provide them with a better career and learning opportunities.

According to [2], 2012 was the year of the MOOCs and keep evolving since then. Table 1.0 describe the evolution of MOOC from MOOC 1.0 to MOOC 4.0.

Table 1.0 MOOC Evolution [3]

MOOC 1.0	One-to-Many	Global lecturing
MOOC 2.0	One-to-One	Individual and group exercises
MOOC 3.0	Many-to-Many	Collective peer teaching
MOOC 4.0	Many-to-One	Presenting one's highest possibility.

Many institutions have spent considerable effort in developing, promoting and delivering MOOCs. However, there are still many unsolved issues relating to the effectiveness of such courses. One of the major issues raised is the constantly high dropout rate of MOOC learners. Current MOOCs suffer from extremely low retention with dropout rates of 90% or more [1]. The course content and course design were identified as among the main factors affecting the completion and dropout rates [4]. [2] highlighted the challenges faced by MOOC instructors from using MOOC. The main challenge is that the instructors are not aware on the purpose and strategies of implementing MOOCs in the classroom. The instructors are also incompetent in developing MOOCs. This is due to lack of mentorship, guidelines and training that will enable them to explore the benefits of MOOCs. The instructors are the content experts but not in using technology to design their courses. Therefore, there is a need to provide a platform that can assist the instructors to design and develop the content for MOOCs.

This paper presents an overview of MOOC 4.0 Dashboard as a tool for MOOC content development and project management.

2. MOOC 4.0 CONTENT DEVELOPMENT AND PROJECT MANAGEMENT DASHBOARD

MOOC 4.0 Management Dashboard is an electronic interface that aggregates and visualizes data from multiple sources, such as databases, files, and services. The dashboard assists the MOOCs content developers in content design and development and the project managers to monitor MOOC project progress and performance by displaying current status, actionable data, and real-time information.

The development of MOOC 4.0 Management Dashboard is guided by the Keller's ARCS Model of Motivation and Web Development Model which provides a systematic process in designing and developing quality and sustainable MOOCs. The application of Keller's ARCS Model of Motivation helps in designing MOOCs content in such a way that keep learners' motivation in learning and completing the courses. Web Development Model provides a systematic process in developing the MOOCs.

The following components are included in the dashboard:

i. Data Entry Panel - This component displays MOOC project information.
ii. Content Planning Panel - This component lists all the phases and development activities for the content developer.
iii. Project Monitoring Panel –This component assists project manager in tracking project progress, which includes the project timeline linked to the components of the Content Planning Panel.
iv. Project Issues Panel - This component displays the critical issues raised throughout the development process.

v. Project Reporting Panel - This component gives a quick visual status report on the development progress.

Figure 1.0 illustrates the components of MOOC 4.0 Dashboard.

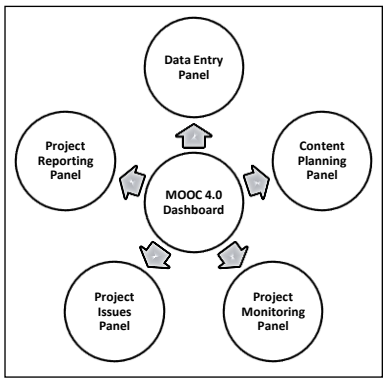

Figure 1.0: MOOC 4.0 Dashboard Components

3. DISCUSSION

This section describes the originality and the practicality of MOOC 4.0 Dashboard.

Originality; MOOC 4.0 Dashboard is a system tool that provides practical guidance for all stages of the MOOCs development process. It is developed based on the MOOC 4.0 Framework [5] which proposes a systematic process in designing and developing quality and sustainable MOOC. MOOC 4.0 Dashboard also incorporates the features of three types of dashboard which are the operational dashboard, the strategic dashboard, and the analytical dashboard.

Practicality; MOOC 4.0 Dashboard offers the following:

i. Data transparency – provides on-demand access of all the most important details.
ii. Access to data – gathers multiple data sources into a single interface, that allow immediate view of the development process. It also reduces the amount of time it takes to compile reports, saving more time.
iii. Better decision making – provides an unbiased view of the overall project progress and performance that offer a foundation for further discussion and great decision making.
iv. Accountability – show the exact problem areas and provide the information needed to be improved.
v. Interactivity – provide a dynamic experience with the ability to filter data, interact with charts to see changes over time, and allow for an ad-hoc component for on-the-fly.
vi. Gamification – to gamify certain development activities that increase the retention of developer. By considering gamification, dashboards can track the success of the project.

4. CONCLUSION

This paper demonstrated the rationale and advantages of MOOC 4.0 Dashboard in assisting the instructors to design and develop MOOCs content. At the same time, also helps in monitoring and managing the entire MOOCs project progress and performance. This may reduce errors and simplify the development process, and also secure the project completion period.

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Android App-based Learning Using Game Method for a Basic Graphic Course

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Keywords: Mobile learning, m-learning, Android apps, games, basic graphics

ABSTRACT – The application of mobile learning or m-learning is a method that has been applied globally. In the Faculty of Technical and Vocational Education (FPTV), Universiti Tun Hussein Onn Malaysia (UTHM) the application of information technology and communication (ICT) is an important aspect of teaching and learning (T&L). The results of a previous study on the students who have taken the course "Basic Graphic" confirmed the difficulty they had faced in understanding the contents of the course. The students also encountered problems in finding learning materials in the Malay language. Therefore, Android app-based learning using a game method for a "Basic Graphic" (AG) course has been developed. The Android application was designed and developed in accordance with ADDIE's teaching and learning materials development model. Additionally, the Framework for Mobile Education Rational Analysis or FRAME model was used as a guide in the development of mobile learning applications. The usability of the game method incorporated into the Android application, particularly for the course "Basic Graphic," was assessed by 33 Bachelor Degree of Technical and Vocational Education (Creative Multimedia) with Honors. The findings suggest that the Android app was able to facilitate the students' understanding of the contents of the course "Basic Graphic" (AG) at any place and time while encouraging self-learning and active learning. Additionally, the game in the learning application was able to provide a fun atmosphere that encouraged the students to continue studying. Hence, this study will discuss the entire development and design process of the Android application. The results of this study are expected to serve as a guide for researchers and instructional design developers, particularly for mobile learning.

1. INTRODUCTION

Mobile learning or m-learning is one of the learning activities that can be used as a supporting material in T&L outside a classroom to strengthen learned knowledge. In a previous study conducted by Mohamad Siri Muslimin et al [5], the use of m-learning was proven to give a positive impact compared to conventional lecture-based learning. The application of multimedia elements such as text, images, audio, video and animation in the design and development of an m-learning can attract and motivate students to continue to learn, the reason being that the learning style of each student is different based on his or her ability (Nor Musliza Mustafa et al.) [9].

In the present study, an Android app that incorporates a game method was developed for the course "Basics Graphic," using the ADDIE model as a teaching and learning design model and FRAME model by Koole [4] as a guide in m-learning development. The level of usability and usefulness of the application was assessed by 33 students undertaking Bachelor of Technical and Vocational Education (Creative Multimedia) with Honors.

2. METHODOLOGY

In developing a mobile learning application for the course "Basic Graphic", the ADDIE model was adopted as the model of instructional design development. This model was chosen because each phase in the ADDIE model emphasizes repetition and is closely related to each other (Aliff Nawi et al.) [1]. Studies on mobile learning has been increasing and therefore, the Framework for Mobile Education Rational Analysis (FRAME) was developed by Koole [4] as a guide in the development of M-learning. The FRAME model describes a mobile learning process consisting of three key aspects: device aspect, individual learning or learner aspect, and social aspect. Figure 1 below shows the interface design of the Android app (AG) "Basic Graphic," which was developed and published in Google Play.

Figure 1: The design of the Android app of the Graphic Base (AG)

After the application was developed, its usability and usefulness level were assessed by means of conducting a questionnaire survey among the students undertaking the course. The respondents of the study consisted of

undergraduate students of Bachelor of Technical and Vocational Education (Creative Multimedia) with Honors at Universiti Tun Hussein Onn Malaysia (UTHM) who have taken the course "Basic Graphic." The sample consisted of only 33 students, determined from the number proposed by Nielsen [8].

A set of questionnaires was developed using Google Forms that were included in the application. The questionnaire consisted of three parts: (i) Part A, (ii) Part B, and (iii) Part C and Part D. Part A queries the respondents' background information. The queries in Part B, Part C, and Part D required the respondents to answer "Yes or No" on an approval scale. The questionnaire was adapted and modified from Aliff Nawi et al. [1]. The data obtained were analyzed by means of frequencies and percentages (descriptive statistics).

3. RESULT AND DISCUSSION

Analysis of Part A of questionnaire shows that 18 respondents (55%) were female and 15 respondents (45%) were male. Figure 3 shows the distribution of the respondents who used a smartphone. The majority of the respondents (24 [73%]) reviewed the lesson via a smartphone. Another 9 respondents (27%) did not respond to the survey by using a smartphone. This finding suggests that the students were more likely to revisit a lesson using a smartphone due to the portability of the tool.

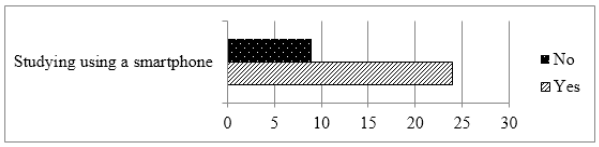

Figure 2: Distribution of respondents who studied by using a smartphone

Figure 3 shows the three types of internet connectivity used by the respondents. The majority of the respondents used mobile data (18 respondents; 55%) to access the internet. Another 8 respondents (24%) used Wi-Fi and mobile data connectivity; 5 respondents (15%) used only Wi-Fi connectivity; 1 respondent (3%) used mobile data and shared hotshot connection; and only one respondent (3%) each used three types of internet connectivity. This finding suggests that each of the students were able to access the Internet from their mobile devices for daily use.

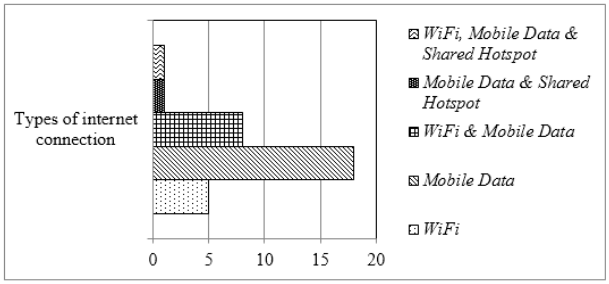

Figure 3: Type of Internet Connection

Part B of the questionnaire queries the level of usability of the application for the course "Basic Graphic" (Table 1). In regard to item five (5), six (6), seven (7) and eight (8), majority of the respondents (100%) agreed that the application was easy to use, and that the user guide provided was easy to understand and can be used without the help of others. However, in regard to item 9 (nine), 29 (88%) agreed that they can change any subtopic at any time, although four (4) respondents (12%) disagreed to this advantage. As for items 10, 11, 12, 13, and 14 all of the respondents (100%) agreed that the Basic Graphics (AG) application displayed information quickly, can be exited at any time, display compatibility with mobile devices, is easy to understand instructions, and requires a relatively short time to master.

In regard to item 15, two (2) respondents (6%) disagreed with the other 31 respondents (94%). As for item 16 and 17, majority of the respondents (100%) agreed that the Basic Graphic Application (AG) was easy to return whenever an error occurred and the navigation buttons provided were appropriate. One respondent (3%) disagreed to item 18 while the remaining 32 respondents (97%) agreed to the item. The majority of the respondents agreed that the fundamentals (AG) of the application worked well.

Table 1: Usability of Game Method in Android app for the course "Basic Graphic"

Item	Statement	Yes		No	
		(*f*)	(%)	(*f*)	(%)
5	This application is easy to use	30	100	0	0
6	The application is user-friendly	30	100	0	0
7	The application provides a guide that is easy to understand	30	100	0	0
8	The application can be used without the help of others	30	100	0	0
9	I can change any subtopic at any time	29	88	4	12
10	The application displays information quickly	30	100	0	0
11	I'm free to quit the app at any time	30	100	0	0
12	The display of the application is compatible with the user's mobile device	30	100	0	0
13	The instructions on this application are easy to understand	30	100	0	0
14	This application takes a short time to master	30	100	0	0
15	I took a short time to remember the functions in this app	31	94	2	6
16	The app is easy to return if there is a mistake while using	30	100	0	0
17	The navigation buttons provided are appropriate	30	100	0	0
18	The app navigation buttons are working	32	97	1	3
19	The app's beneficiaries work well	30	100	0	0

Table 2 summaries the findings in terms of the usability of the application for the course "Basic Graphic," as queried in Part C of the questionnaire. The findings show that 32 respondents (97%) agreed that the application had helped them to revise the lessons anywhere. All the respondents (100%) agreed that the application managed to help them to review the lesson at any time. Another 31 respondents (94%) agreed that the application had encouraged self-learning.

As for items 23, only 29 respondents (88%) agreed that the application provided a note that would allow them to

review the content of the lesson, although four (4) (12%) respondents disagreed to this advantage. As for item 24, majority of the respondents (32 [94%]) agreed that the notes provided had helped them to increase their knowledge outside the classroom. This finding indicates that the notes provided in the Android Basic Graphic Application (AG) app managed to help the students to easily review lessons while gaining knowledge beyond their classroom. Meanwhile, all of the respondents (100%) agreed to items 25 and 26 in that the learning resources provided in the application facilitated their understanding of a given topic and perform the given assignment thus demonstrating that the video was very effective.

In regard to items 27, 28, 29 and 30, majority of the respondents agreed that the game method applied for the Android Basic Graphic Application (AG) app was able to attract them to learn, as well as enhance their understanding of a given topic. As for item 31, 32, 33 and 34, 31 respondents (94%) agreed that the "message space" feature had encouraged them to communicate and share information with other lecturers and students. This means that the messaging space feature meets the social needs of the student to connect with other users. Analysis of responses for item 35 indicates that 32 respondents (97%) agreed that the Android Basic Graphics (AG) application was fun to use.

Table 2: The Usefulness of Android apps using the game method for Graphic Basics courses

Item	Statement	Yes		No	
		(*f*)	(%)	(*f*)	(%)
20	The app helped me to review the lessons anywhere	32	97	1	3
21	The app helped me review lessons at any time	33	100	0	0
22	The application promoted self-learning learning	31	94	2	6
23	The notes provided made it easier for me to review the content of the lessons	29	88	4	12
24	The notes provided helped me to increase my knowledge outside the classroom	32	94	1	6
25	Video learning can help me to understand the subject matter	33	100	0	0
26	Learning videos can help me to carry out the assignment given	33	100	0	0
27	The games can attract my interest to learn	31	94	2	6
28	The games can improve my understanding of a given topic	32	97	1	3
29	The games can help me master the learning topics	32	97	1	3
30	The games can strengthen my knowledge in the topic of study	30	91	3	9
31	The text messages feature allowed me to talk about learning topics with other students	31	94	2	6
32	The mailboxes feature made it easier for me to communicate with online lecturers	31	94	2	6
33	The message space feature made it easy for me to share information with others	31	94	2	6
34	The message space feature can help me to obtain information from others	31	94	2	6
35	The app was fun to use	32	97	1	3

Table 3 presents the analysis of the multimedia elements of the Android app for the Basic Graphic (AG) course. A total of 32 respondents (97%) agreed that the type of writing used was appropriate; 33 respondents (100%) agreed that the size of the writing used was appropriate; and 31 respondents (94%) agreed that the writing color on the Android Basic Graphic Application (AG) was appropriate. This finding may indicate that the majority of the respondents agreed that the type, size, and color of the text used in the application was suitable for mobile device display. In regard to the photos used for the application (items 39, 40 and 41), majority of the respondents agreed that the pictures provided were clear and in accordance with the stated examples.

Pertaining to items 42 and 43, 31 respondents (94%) agreed that the background of the music and sound effects on Android Core Graphic applications (AG) were appropriate. For items 44, 45, and 46, majority of the respondents agreed that the videos provided in the application were very interesting and of good clarity. Additionally, 33 respondents (100%) agreed to items 47 and 48 in that the animation applied to the Android Basic Graphic App (AG) app was suitable and able to attract students. This finding indicates that the overall multimedia content of the posts, pictures, audio, video and animation on the Android Core Graphic (AG) app were appropriate.

Table 3: Multimedia Elements in the Android Applications for Graphic Basic Course (AG)

Item	Statement	Yes		No	
		(*f*)	(%)	(*f*)	(%)
36	Font used in this application is suitable	32	97	1	3
37	The text size used in this application is suitable	33	100	0	0
38	The text colour of this application is	31	94	2	6
39	Pictures provided clearly	33	100	0	0
40	Pictures provided according	32	97	1	3
41	Pictures given in accordance with the stated example	33	100	0	0
42	The background music used is suitable	31	94	2	6
43	The sound effects on this application worked well	31	94	2	6
44	The video clips provided are very interesting	32	97	1	3
45	The quality of the videos provided was excellent	32	97	1	3
46	The clarity of sound on the video clip provided excellent	33	100	0	0
47	The clarity of sound on video clip provided was excellent	33	100	0	0
48	The animations in this app attracted my interest	33	100	0	0

The findings show that the application developed was able to help the students to review their lessons anywhere and anytime because once downloaded, the application can be accessed offline on the students' mobile device. As noted by Mohamed Amin Embi et al. [6], the use of mobile technology in teaching and learning (T&L) encourages self-learning because the contents provided

(such as notes, learning videos and games) manage to help students to add and reinforce their existing knowledge.

The findings also indicate that the method of gameplay applied for the Android app was able to attract the students to learn and improve their understanding of the course topics as well as mastering and strengthen their knowledge on a given topic. As noted by Mustari Karjo Mohd Ismail et al. [7], a learning process that implements game methods involves the transfer of information or knowledge to students in a fun environment. This notion therefore implies that an Android app that incorporates a game method would provide a fun learning environment that can attract students and reinforce the knowledge they have gained.

The application of multimedia elements such as text, graphics, audio, video and animation for an Android app is appropriate and can attract students to continue using the learning app during review. As noted by Poonam [10], the combination of multimedia elements and the correct teaching design can produce a useful game-based learning method. As noted by Cruse [2], learning materials that embrace good multimedia can deliver messages and encourage active learning processes to be cognitive. Such materials can also have a positive impact on student achievement [3].

Overall, the findings of the study confirm that the application managed to help the students to review their lessons outside the classroom regardless of time and place. The mobile learning method also provided the students with a fun learning environment and encouraged self-learning. Furthermore, the learning method, which integrates Information and Communication Technology (ICT) facilities, was found to be suitable for students in the Faculty of Technical and Vocational Education (FPTV), Universiti Tun Hussein Onn Malaysia (UTHM) as an exposure to future generations of educators.

4. CONCLUSION

This study is a design and development study or Design and Development Research (DDR) in which a mobile learning application or m-learning was developed through a five-phase instructional design based on ADDIE Model. The Framework for Rational Education Rational Analysis or FRAME Model was used as a guide in the development of the m-learning as suggested by Koole [4].

The game method incorporated in the Android app was developed to help the students undertaking the Basic Graphic course to improve their understanding and reinforce knowledge beyond classroom regardless of time and place. The mobile-based learning not only provided virtual or virtual learning environments but also promoted self-learning. The Basic Graphics Application (AG) is presented with notes, learning videos, games and messages to allow users to share information with other friends and educators. However, it is worth to note learning via the application requires an internet connection and that the application was developed only for Android operating system users.

5. ACKNOWLEDGEMENT

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Designing a Flipped Classroom Lesson Using the AOCAR Technique

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Keywords: flipped classroom, ARCS Model, AOCAR technique, digital tools, fun learning

ABSTRACT – The Gen-Z students are tech-savvy, more hands on and prefer to be actively involved in their own learning. They welcome challenges, prefer collaborative work and highly interactive classroom. They grow up in a hyper-connected world and smart phones have become their best friends. Despite having access to almost unlimited information, they are still lacking in terms of the ability to make sound judgment and to apply the information that they have gathered. This is where the class instructors should come in to facilitate the discussion and show relevant applications of the information. A flipped classroom is a solution to this problem and the AOCAR Technique offers a step-by-step guide to design a lesson for a flipped classroom. The AOCAR Technique, forms by an acronym of Attention, Objectives, Contents, Activities and Reflections, incorporates the elements of the ARCS Model to ensure the students are engaged throughout the learning process, find the learning experience relevant and able to enhance their skills and knowledge in the related fields. Integration of computer applications in the learning process offers learning varieties and makes it more relevant to the students of the present generation. What is most important is the students feel confident to take part in a fun and non-threatening learning environment besides promoting good relation and respect towards each other and the language instructors. Explanation of each step of the technique, a sample lesson, students' works and feedback on the implementation of the technique are provided to assist language instructors in adopting the technique.

1. INTRODUCTION

The approach to teaching and learning needs to reflect the needs of the present generation. Some of the approaches that work wonders before may not be that relevant today. The present generation who is studying at the higher learning institution was born after 1995 and they are known as the Generation Z (Gen-Z). This generation has grown up in a hyper-connected world and their preferred mode of communication is the smartphone [1]. They spend an average of 15.4 hours on smart phones [2]. The Gen-Z are multimodal learners who prefer to be engaged through multiple learning channels so that information can be delivered in various ways [3]. They are more independent and do not require spoon-feeding. If they need to find out about something, they will search it online. They prefer to feel, hear, see, touch and experience their learning which can be enhanced through the use of technology [3]. Despite being able to access to a lot of information at their fingertips, they are lacking in terms of the ability to make sound judgement which reflects their poor critical thinking ability [3]. This is where the language instructors should play their role. The language instructors should facilitate the discussion by providing opportunities for higher order thinking skills and critical reasoning, and show relevant applications of the content within the classroom after the students have done their part in searching for the information related to the content of the lessons [3]. One of the ways to do this is to adopt a flipped classroom approach.

A flipped classroom is an instructional strategy that reverse the conventional approach of classroom-based learning to an online environment outside the classroom. It is also a type of blended learning. In this approach, students are introduced to the learning materials earlier and the class time is used to deepen their understanding of the learning materials through discussion and problem solving activities facilitated by the instructors. It also enables class instructors to be very flexible and creative in designing learning activities [4].

Designing lessons and learning activities need to be done carefully in order to achieve the learning outcomes of the lessons. The AOCAR technique offers language instructors a step-by-step approach to design an interactive lesson for their students. As for the digital tools, there are many websites that instructors can choose to find suitable digital tools for their flipped classroom. Some of the websites that provide wonderful ideas are:

- https://www.thetechedvocate.org/10-edtech-tools-flipped-classroom [5],
- https://www.edutopia.org/article/4-tools-flipped-classroom [6] and
- https://filmora.wondershare.com/screen-recorder/best-tools-for-flipped-classrooms.html [7]

Objectives of the Study

1. To explain the components of the AOCAR technique
2. To provide a sample lesson using the AOCAR technique
3. To obtain the students feedback on the lesson

designed using the AOCAR technique

2. METHODOLOGY

Samples: A purposive sampling method was used in the study. The first group to take part in a lesson designed using the AOCAR technique was the Part 4 Semester 2018/2019 students. This technique was used in the Job Application Process course. All 23 students in the group took part in the study.

Design and Development: The AOCAR technique consists of 5 design steps and each step represents A-Attention, O-Objectives, C-Content, A-Activities, and R-Reflection respectively. The five design steps of AOCAR are adaptation of Gagne's Nine Events of Instruction. Each step of the technique has its own suggested digital applications that can be used to enhance the learning process. The AOCAR technique takes into consideration the 4 elements of ARCS to ensure the learning process manages to attract the students, relevant to the students' need to acquire skills and knowledge which will enable them to be involved in the learning process confidently. Students are hoped to feel satisfied with what they achieve and acquire throughout the whole process of learning.

Implementation: The AOCAR technique was applied to the whole course and OpenLearning.com served as the main online learning platform to host the course. In this study, the MOOC at OpenLearning platform was used to support BL approach adopted by the researcher. Similar to other flipped classroom approach, class instructors must assign the some readings and related learning preparations for students to do before they come to class. Information related to the learning preparation can be shared in the MOOC at openlearning.com Since AOCAR is a topic-based technique, one of the topics in the course was selected to illustrate the application. The topic was on Video Resume. The application of the AOCAR technique for the selected topic would be presented in detail.

Instruments: Several online applications were used in the study. Different learning activities required different digital tools. For the lesson on Video Resume, OpenLearning.com, Mentimeters.com, WhatsApp, HP Reveal, Google Form and a video editing tool were used to impart knowledge, elicit responses, complete the activities and to get the students to reflect on the learning activities. A survey was used to obtain the students' feedback on the instructional approach used for the course. There were also questions specifically designed according to the topics in the course.

Data Collection Procedure: Data collection for each AOCAR step was conducted for one whole semester. Data collection on the students' reflection and the survey were conducted at the end of the course.

3. RESULT AND DISCUSSION

Components of the AOCAR technique

The AOCAR technique is used to design a lesson plan for a course. It is adapted from Gagne's Nine Event of Instruction and is guided by Keller's ARCS Model. Two of the events in Gagne's were excluded from the technique that are assessment of performance and retention and transfer. Assessment is not part of the AOCAR technique as not all topics are followed by assessments immediately after they are covered by the language instructor. However, there is one additional step which is not in Gagne's that is the student's reflection of the lesson.

There are 5 steps to be completed when designing a lesson for a certain topic. The first step is Attention: The language instructor needs to get the attention of the students and relate it to what to be learned in the course / topics to be covered. Highlight the importance of the course / topics. Secondly, Objectives: The language instructor needs to inform the students about the knowledge / skills that they would acquire by the end of the lesson. Thirdly, Content: the learning instructor needs to present the content, discuss the tasks assigned earlier or add necessary information to supplement content. Fourthly is the Activities: Students are to take part in the activities prepared for them. Lastly, Reflection: Students are required to write a brief reflection on their learning experience for the lesson. The language instructor needs to select suitable digital tool(s) for each level of the AOCAR technique. The use of the digital tools in today's classroom is very important as it matches with the learning needs of the tech-savvy Gen-Z's students. The use of digital tools in the classroom will still be combined with the conventional approach as some classrooms has limited or inconsistent access to the internet. When designing the lesson using the AOCAR technique, the language instructor also needs to embed the four elements of motivation that are the Attention, Relevance, Confidence and Satisfaction [8]. Figure 1 shows the AOCAR technique to design a lesson for a course.

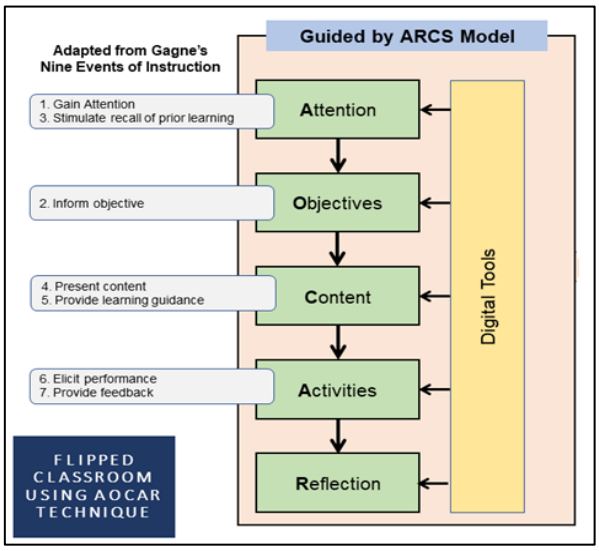

Figure 1: The AOCAR Technique

A sample lesson using the AOCAR technique

Tables 1-5 show the steps in the AOCAR technique, explanation of each step, digital tools for the sample lesson and a comparison to Gagne's Nine Events of Instruction.

Table 1: Step 1 Attention

STEP 1	A (Attention Getter)
EXPLANATION	Get the attention of the students, relate it to the course / topics to be covered. Highlight the importance of the course / topics.
TOOLS	https://www.menti.com/
SAMPLE LESSON: Video Resume	• Ask the students to choose 3 ways to sell a product. Students are to respond using an interactive presentation app: mentimeter.com. • Ask the students to justify their choices. • Relate their responses to the topic of the lesson: Video resume. • Explain how the topic is related to the previous lessons.
Gagne's Nine Events of Instruction	1.Gain attention 3. Stimulate recall of prior learning.

Table 2: Step 2 Objectives

STEP 2	O (Objectives)
EXPLANATION	Inform the students about the knowledge / skills that they would acquire by the end of the lesson.
TOOLS	Open Learning platform.
SAMPLE LESSON: Video Resume	• Explain the relevance of the topic to the whole course. • Inform the objectives of the lesson.
Gagne's Nine Events of Instruction	2. Inform objectives

Table 3: Step 3 Contents

STEP 3	C (Contents)
EXPLANATION	• Present the content. • Discuss the tasks assigned earlier. • Add necessary information to supplement content.
TOOLS	Open Learning platform.
SAMPLE LESSON: Video Resume	• A reading list is provided in OL platform and students have been asked to read about video resume. • Show some samples of video resumes. Students are to conduct a video evaluation. • Share their opinion in OL platform: https://www.openlearning.com/courses/secure-your-dream-job/activity_2_evaluate_the_videos. • Discuss the opinion with the whole class. Summarize the important elements for an effective video resume (by the class instructor).
Gagne's Nine Events of Instruction	4. Present the content. 5. Provide learning guidance.

Table 4: Step 4 Activities

STEP 4	A (Activities)
EXPLANATION	Take part in class activities.
TOOLS	• Handphone Camera • WhatsApp. • OpenLearning Platform • HP Reveal • Video editing software.
SAMPLE LESSON: Video Resume	• Create an idea pitching video for a fund-raising project (group work). This activity is to reduce students' anxiety of presenting in front of a camera. Working in a group to prepare the content of the video and recording their video together provide some experience and can help reduce anxiety level. Discussion is during the class time. Recording of video is done outside the class time. • Presentation and feedback are done in the following week. • Students are introduced to AR using HP Reveal to provide variation in the way of presenting the videos. Sample videos are available at https://www.openlearning.com/courses/secure-your-dream-job/group_task_fund_raising_campaign
Gagne's Nine Events of Instruction	6. Elicit performance. 7. Provide feedback.

Table 5: Step 5 Reflection

STEP 5	R (Reflection)
EXPLANATION	Write a brief reflection on your learning experience this week.

TOOLS	Google Form
SAMPLE LESSON: Video Resume	Write a brief reflection about your learning experience this week. You can write about the knowledge acquired, the approach used by the instructor, strengths, weaknesses and suggestions to improve the teaching and learning of the module.

Students feedback on the lesson designed using the AOCAR technique

A short survey was conducted at the end of the lesson on video resume. The questions were about their opinion towards the approach used in the lesson on video resume, the benefits and weaknesses of the approach, suggestions to improve the approach and overall rating of the effectiveness of the approach. The results are displayed in Figures 2-6.

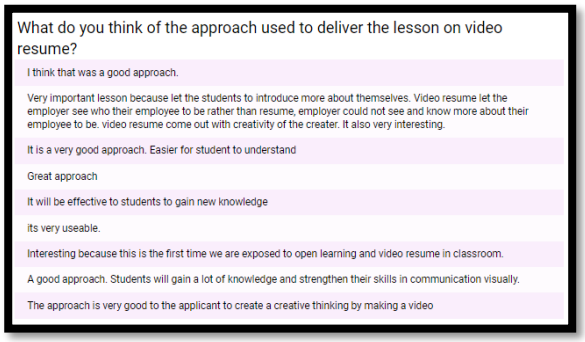

Figure 2: Students' Opinion About the Lesson Approach

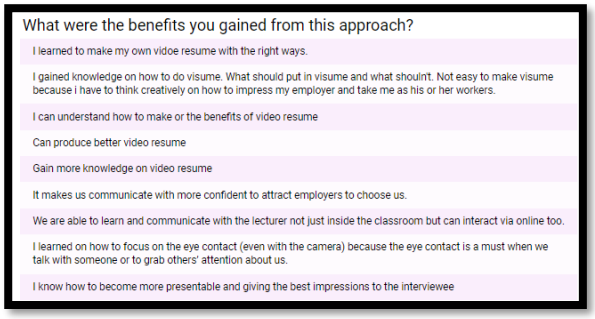

Figure 3: Students' Opinion About the Benefits of the Approach

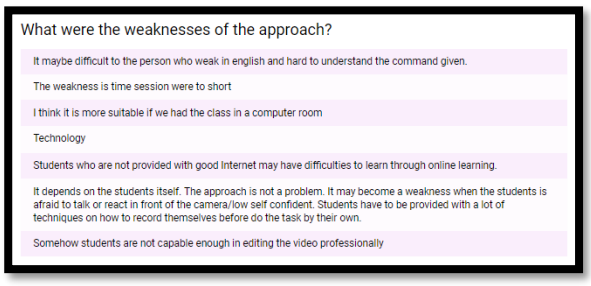

Figure 4: Students' Opinion About the Weaknesses of the Approach

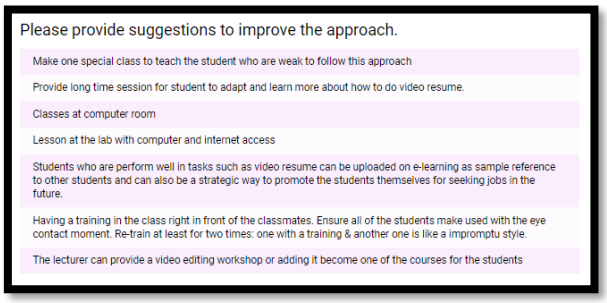

Figure 5: Students' Suggestions to Improve the Approach

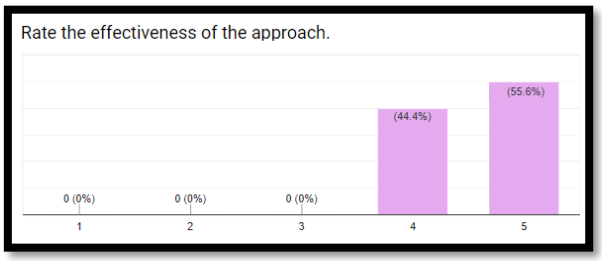

Figure 6: Students' Rating on the Effectiveness of the Approach

4. CONCLUSION

The AOCAR technique enables the class instructors to offer a meaningful learning experience for the students as they are given more responsibility towards their own learning. Being active participants in learning trains the students to be more critical in analyzing certain issues or challenges. Learning becomes more interesting and relevant and able to increase students' confidence and satisfaction levels. Besides that, it allows the students to interact and collaborate actively with other students. This will improve their performance in terms of the knowledge and skills related to the course. The use of digital tools in the classroom adds some varieties to their learning experience.This technique also allows language instructors to be creative in mixing and matching approaches and tools suitable with the preferences of the Gen-Z students. The relationship between language instructors and students can be closer as students feel comfortable to participate actively in the classroom.

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Instructional Games for Assessment of Performance in Learning Grammar

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Keywords: grammar, instructional games, game elements, assessment, performance

ABSTRACT – Learning has to be evaluated through assessments in order to indicate learning performance. Instructional games have the potential as the tool for assessment of performance since they have two distinct features which are fun and educational. Certain game elements inform students of their learning performance. Consequently, students can gauge their learning progress which answer the students' question on "how they are doing". Thus, instructional games for assessment of performance must be gamified with specific game elements. Four game elements namely score, level, timer, and immediate feedback are identified essential for the purpose of assessment of performance in learning grammar. Two instructional games for learning grammar were designed with the four game elements in order to investigate the usefulness of the game elements for students to assess their performance.

1. INTRODUCTION

Assessments for learning is significant for the instructor and students as assessments can evaluate the teaching effectiveness of the instructor and the learning quality of students. With regard to students, assessments indicate their learning performance so that they may use assessments to gauge their learning performance. Consequently, students can gauge their learning progress which answer the students' question on "how they are doing". Then, they may adjust their learning in order to achieve their learning objectives.

Instructional games have been proven to enhance learning by increasing knowledge, and enhancing skills, increasing the engagement in leaning activities and improve performance [1]. Instructional games are also significant for assessment of performance when they are designed and developed with specific game elements that facilitate students to gauge their performance (Garris, Ahlers, & Driskell, 2002; Bellotti, Kapralos, Lee, Moreno-Ger, & Berta, 2013; Landers, 2014). Therefore, instructional games have the potential as the tool for assessment of performance since they have two distinct features which are fun and educational. Since, instructional games have the fun features, the process of evaluating students may take place in the fun way. Thus, test anxiety may be reduced compared to taking conventional assessments.

There are several game elements that are significant for assessment of performance in instructional games such as score, level, timer, badges, immediate feedback, progress bar and leaderboard. However, the instructional games that were designed and developed for this project only focusses on four game elements namely score, level, timer and feedback.

The selection is made based on how the game elements benefit students in assessing their learning performance. Score informs students if they have done correctly or wrongly (Landers, 2014). Score is also used for levelling up [5]. Score and level may motivate students extrinsically [6] since it indicate how much learning objectives are achieved. Score and level make students feel their progress (Dichev, Dicheva, Angelova, & Agre, 2014; Nebel, Schneider, Beege, & Rey, 2017). When students move up to the next level, it shows that they have achieved certain learning objectives at the previous level.

Next, timer is used to limit the time spent for completing a task in instructional games. Timer stimulates students to be more engaged in a task since timer force them to achieve their objectives within the time provided [8]. Thus, timer allows students to gauge their progress towards attaining their objectives (Schunk, 2012). The time provided should be sufficient for completing tasks in instructional games as to ensure the tasks are challenging [9].

Finally, feedback in instructional games is immediate. It helps students to check their progress [6], provide reasons for the correct or wrong response (Dichev et al., 2014), make students feel comfortable to attempt something new and challenging as because they can regulate their response accordingly [5]. Sufficient [10] and meaningful [11] feedback in crucial to facilitate learning progress. Thus, feedback in instructional games offers an assessment of progress in order to achieve learning objectives and cause motivated students to put more effort, determination and attention on the task (Garris et al., 2002).

The research is design and development research that involves developing products through a systematic process (Richey & Klien, 2007) and follow a framework by Hevner, March, Park and Ram (2004) as illustrated in Figure 8. This paper only reports on Phase

1, 2 and 3.

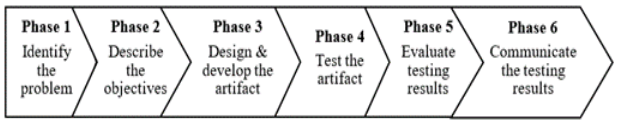

Figure 8: Design and development framework by Hevner et al. (2004)

2. METHODOLOGY

Phase 1: Identify the problem; The problem was that how to make grammar instructional games as a tool for assessment of performance for students gauge their learning.

Phase 2: Describe the objectives; the objectives of developing the grammar instructional games were to include game elements that (1) can inform students whether their response is correct or wrong (2) can inform students' learning progress, and (3) can explain why students' response is correct or wrong so that they can progress in their learning. The game elements identified for (1) were score, corrective feedback and praise feedback, (2) were level and timer, and (3) was explanatory feedback.

Phase 3: Design & Development; The first instructional game was on subject-verb agreement using treasure hunt as the theme. While the other game was on seven English tenses using healthy lifestyle as the theme. There were nine mini games and three levels (Esay, Moderate and difficult) in each instructional games. The difficulty levels were determined by the revised Bloom's Taxonomy and readability of single sentences that were used to construct the grammar questions. For both instructional games, Gagne Nine Events of Instruction, was applied when preparing the story boards. It was applied as follow:

Table 2 Application of Gagne Nine Events of Instruction

	Step	Game Activities
1.	Gain Attention	Present games with the background music to attract student in playing the instructional games
2.	Inform students	Present what the games are about, game rules, game objectives and learning objectives
3.	Stimulate recall	Provide short notes to relate the games with the prior knowledge on the items tested in the games
4.	Present material	Present the questions
5.	Provide guidance	Provide clear instructions on how to answer questions
6.	Elicit performance	Students answer the questions
7.	Provide feedback	Provide immediate feedback
8.	Access performance	Provide score
9.	Enhance retention and transfer	Provide links to notes and extra practice

The instructional games were developed by using a free application named Scratch that is available on https://scratch.mit.edu/. They were also published online for free on the Scratch website. They can be played on computers and smartphones. The links of the instructional games can be embedded in any online platform. The game flow of both games are as follow:

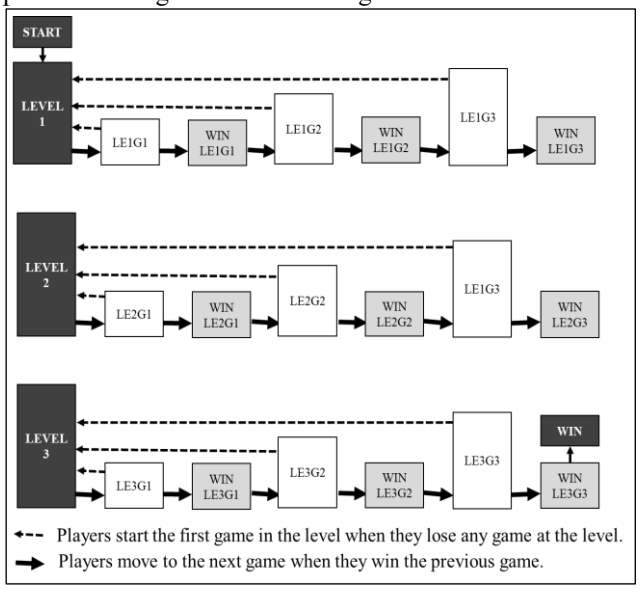

Figure 9: The game flow

The time provided for each task in the instructional games were obtained by asking students to play the instructional games. The selection of students was through purposive sampling as the researchers wanted to get the students at the intermediate level of English proficiency. The number of sample for Tee Island: Quest for Treasure was 39 students while for EGG: Tenses was 38 students.

3. RESULTS AND DISCUSSION

The average time that was used by students to complete each mini games in both instructional games are as follow:

Table 3 Average time in minute for Level 1

Instructional Games	L1G1	L1G2	L1G3
Tee Island:	2.78	2.83	2.92
EGG: Tenses	2.75	2.72	2.94
Rounded Time	3	3	3

Table 4 Average time in minute for Level 2

Instructional Games	L2G1	L2G2	L2G3
Tee Island:	3.31	3.36	3.33
EGG: Tenses	3.17	3.36	3.36
Rounded Time	3	3	3

Table 5 Average time in minute for Level 3

Instructional Games	L3G1	L3G2	L3G3
Tee Island:	3.56	3.56	3.69
EGG: Tenses	3.58	3.67	3.92
Rounded Time	4	4	4

The results indicate that the time that should be allocated for the mini games in the two levels, Easy, and Moderate was three minutes whereas for the third level, Difficult, was four minutes.

The screen shots of the instructional games that show how score, level, timer and immediate feedback were designed are as follow:

Figure 10: Praise feedback for a correct response

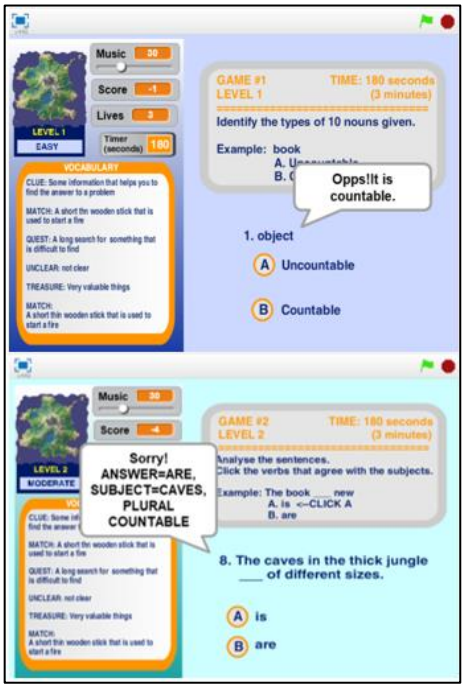

Figure 11: Explanatory feedback for wrong responses

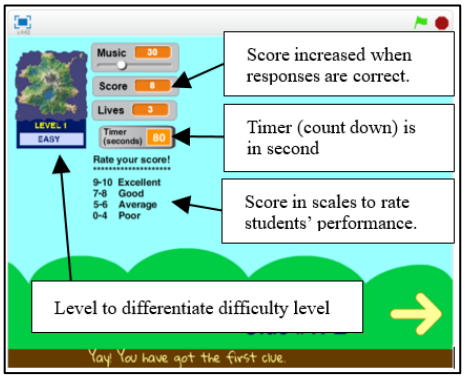

Figure 12 Score, level and timer

4. CONCLUSION

This study presents the process of designing and developing the grammar instructional games focusing on the game elements for assessment of performance. There are three more steps namely testing the instructional games, evaluating test results and communicating the test results need to be completed to evaluate the effectiveness of the game elements for assessment of performance.

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Gamifikasi Global Halal Game (GHG) dalam e-Pembelajaran

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

ABSTRAK – Tahap kesedaran masyarakat terhadap kepentingan ilmu kepenggunaan dan pensijilan halal masih belum mencapai tahap yang memuaskan. Menurut Dewan Perniagaan Melayu Malaysia (DPMM) Negeri Sembilan, hanya 10 daripada 30 usahawan produk makanan yang berdaftar di bawah DPMM mempunyai sijil halal (Sinar Online, 2016). Justeru, kesedaran dan kefahaman terhadap kepentingan ilmu kepenggunaan dan pensijilan halal perlu diterapkan di setiap peringkat umur bermula seawal di bangku persekolahan. Bahan bantu mengajar merupakan salah satu permasalahan yang perlu diatasi khususnya dalam menghasilkan inovasi baharu yang boleh menjadi medium alternatif kepada guru dan pelajar dalam mempelajari ilmu halal. Menyedari hal ini, inovasi gamifikasi Global Halal Game (GHG) telah diperkenalkan untuk menjadi bahan bantu mengajar kepada guru dan pelajar dalam proses P&P 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 meliputi soalan-soalan uji minda yang mampu menilai tahap kefahaman dan kemahiran ilmu halal dalam kalangan pengguna. GHG diyakini mampu menjadi platform bahan bantu mengajar yang terkini berkonsepkan e-pembelajaran, interaktif dan efektif.

1. PENDAHULUAN

Kemajuan dunia teknologi hari ini telah mewujudkan perkembangan yang begitu pesat dalam bidang inovasi dan penyelidikan. Pelbagai sistem, alatan dan kelengkapan terkini dicipta untuk membantu memudahkan manusia dalam melakukan aktiviti harian mereka termasuk dalam sistem pendidikan. Kewujudan ilmu teknologi dan maklumat (IT) serta hasil inovasi terkini juga mempengaruhi penciptaan kaedah dan cara baru bagi penyampaian maklumat dan pengetahuan kepada masyarakat umumnya dan para penuntut ilmu khususnya. Ia telah menjadikan proses penyampaian sesuatu mesej daripada seorang individu kepada individu yang lain lebih cepat dan berkesan. Perkembangan ini juga berjaya melahirkan satu kaedah baru dalam bidang IT iaitu kaedah gamifikasi.

Secara umumnya, gamifikasi ialah satu proses penerapan unsur permainan dalam sesuatu subjek yang bukan permainan bertujuan menjadikannya lebih menarik serta mewujudkan perasaan gembira bagi setiap individu yang terlibat. Gamifikasi dalam bidang pendidikan pula boleh difahami sebagai satu proses penerapan unsur permainan dalam menyampaikan ilmu dan pengetahuan kepada para pelajar. Istilah gamifikasi mula dicetuskan pada tahun 2002 oleh pencipta permainan warga Britain bernama Nick Pelling dan ia makin banyak digunakan pada tahun 2010 (Kamasheva A.V. et. al, 2015). Selain daripada bidang pendidikan, kaedah gamifikasi turut digunakan untuk meningkatkan motivasi pekerja, menjalinkan hubungan dengan pelanggan dalam bidang perniagaan, serta mengumpulkan sumbangan dana secara kelompok. Kemudahan peralatan teknologi yang wujud pada hari ini telah menjadikan kaedah gamifikasi menjadi lebih menarik dan popular apabila masyarakat mula beralih kepada kaedah yang lebih santai dan ringan dalam mempelajari dan memahami sesuatu maklumat termasuk dalam pendidikan Islam.

Kekuatan yang ada pada kaedah pendidikan melalui gamifikasi dan sistem persekolahan biasa adalah saling melengkapi antara satu sama lain. Pengaplikasian elemen permainan dalam pembelajaran merupakan alternatif baru yang penting dan perlu diterapkan dalam sistem pendidikan sedia ada pada hari ini. Dua elemen yang disatukan ini boleh membawa kepada natijah yang penting untuk membina kemahiran yang pelbagai dalam abad ke-21 ini. Inovasi baru yang diperkenalkan dalam bidang halal seperti GHG mampu menjadi model dan panduan khusus kepada para ilmuan dan umat Islam untuk mencipta kaedah penyampaian ilmu yang lebih kreatif dan berkesan.

Justeru, kajian ini akan melihat kelebihan inovasi gamifikasi GHG dalam meningkatkan kualiti dan keberkesanan sistem pengajaran dan pembelajaran subjek pendidikan halal.

2. METODOLOGI

Kajian ini menggunakan pendekatan kualitatif yang melibatkan kaedah dokumentasi dan temu bual.

Kaedah dokumentasi merangkumi pembacaan dan penyelidikan terhadap bahan-bahan bercetak termasuklah sukatan pelajaran Pendidikan Islam Tahun 1, 2, 4 dan 5 serta Tingkatan 1, 2, 4 dan 5, Kementerian Pendidikan Malaysia (KPM), buku-buku asas mazhab Shafi'e, Manual Prosedur Pensijilan Halal Malaysia dan laporan halal daripada institusi-institusi halal negeri seluruh Malaysia.

Manakala kaedah temu bual melibatkan peserta kajian daripada kumpulan pakar yang terdiri daripada ahli akademik, guru dan pegawai institusi halal untuk mendapatkan pengesahan pakar terhadap Global Halal Game (GHG) yang dibangunkan.

3. DAPATAN KAJIAN DAN PERBINCANGAN

Global Halal Game (GHG) merupakan sebuah permainan papan ilmiah ala monopoli yang bertemakan ilmu pendidikan halal dibangunkan menggunakan konsep gamifikasi bagi meningkatkan kesedaran dan kefahaman berkaitan halal kepada setiap lapisan masyarakat.

Melalui kajian ini, penyelidik telah mengenal pasti beberapa ciri-ciri yang perlu diterapkan kedalam gamifikasi GHG bagi membantu meningkatkan keberkesanan proses P&P dan latihan kepada Eksekutif Halal serta menjadikan permainan ini sebagai bahan bantu mengajar yang terkini berkonsepkan e-pembelajaran, interaktif dan efektif.

Ciri–ciri Global Halal Game (GHG)

Tiga Aras Soalan. Terdapat tiga aras soalan yang berbeza iaitu rendah, sederhana dan tinggi. Ketiga-tiga aras soalan ini ditandakan dengan warna yang berbeza pada papan permainan iaitu petak biru bagi aras satu, petak merah bagi aras dua dan petak hijau bagi aras tiga. Dalam permainan ini, pemain pertama membaling dadu dan menggerakkan bidak mengikut bilangan yang diperolehi. Pemain akan menerima perintah dan soalan uji halal di atas petak papan di mana bidak berhenti. Sekiranya pemain berhenti di petak uji halal, pemain lain yang berada di sebelah kiri akan membacakan soalan uji halal dengan kuat. Pemain yang menjawab dengan betul akan menyimpan kad Uji Halal tersebut, manakala pemain yang gagal menjawab dengan betul akan mengembalikan kad uji halal ke dalam dek kad uji halal di bahagian bawah. Pemain yang berjaya mengumpul 5 kad uji halal dalam satu kategori boleh menebus kad Halal bagi kategori tersebut. Pemain yang berjaya mengumpul ketiga-tiga kad Halal bagi setiap kategori perlu kembali ke logo IHRAM yang berada di tengah-tengah papan permainan sebelum menjawab soalan Halal Audit untuk disahkan sebagai pemenang.

Manual Prosedur Pensijilan Halal Malaysia (MPPHM). GHG menggunakan sukatan Manual Prosedur Pensijilan Halal Malaysia (MPPHM) sebagai asas untuk membina soalan aras tinggi, sederhana dan rendah. Soalan-soalan adalah berkisar tentang prosedur, syarat-syarat pensijilan, pemantauan, penguatkuasaan dan lain-lain lagi berkaitan pengurusan halal di Malaysia seperti yang digariskan oleh JAKIM. Soalan-soalan yang dibina masih tertumpu kepada perkara-perkara asas yang terdapat dalam bidang Halal.

Silibus Subjek Pendidikan Islam Tahun 1, 2, 4 dan 5 serta Tingkatan 1, 2, 4 dan 5. GHG juga sesuai dijadikan bahan bantu mengajar bagi subjek yang berkaitan halal khususnya di sekolah rendah dan menengah kerana soalan-soalan yang diajukan adalah menepati sukatan yang dipelajari di sekolah. Konsep yang diperkenalkan melalui permainan ini juga menepati corak pembelajaran abad ke 21 (PAK21) yang mementingkan elemen komunikasi, kolaboratif, pemikiran kritis, kreativiti, nilai murni dan etika. Dengan menerapkan konsep didik hibur dan gamifikasi menjadikan sesi P&P di dalam kelas lebih interaktif dan mampu menarik minat pelajar untuk mempelajari perkara-perkara yang berkaitan halal melalui permainan ini.

Bahan Bantu Mengajar atas Talian. Inovasi GHG bukan sahaja memfokuskan terhadap ciri-ciri fizikal permainan papan malah turut merangkumi video serta slaid panduan dan rujukan permasalahan berkaitan ilmu halal yang boleh diakses melalui laman sesawang bagi membantu pelajar meningkatkan pemahaman terhadap konsep dan isu halal. Elemen ini akan mewujudkan kaedah pengajaran dan pembelajaran pendidikan ilmu halal secara interaktif dan ilmiah.

4. PENUTUP

Pendidikan fleksibel melalui gamifikasi merupakan satu kaedah penambahbaikan dalam proses pengajaran dan pembelajaran pada hari ini. Global Halal Game (GHG) merupakan sebuah papan permainan yang dibangunkan dengan ciri-ciri gamifikasi yang berkesan untuk mewujudkan konsep didik hibur *(edutainment)* dalam pendidikan berkaitan ilmu halal. Para ahli akademik dan pereka permainan perlu lebih kreatif dalam membangunkan lebih banyak permainan ilmiah yang boleh dijadikan sebagai bahan bantu mengajar yang interaktif di samping mampu membantu pelajar menguasai mata pelajaran serta mengambil bahagian dalam aktiviti sosial yang sihat.

5. ACKNOWLEDGEMENT

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A Study of User Acceptance towards Learning Shorthand Via Mobile Application; ShortApps: Shorthand for Beginners

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Keywords: shorthand, mobile application, secretarial science, behavioural intention,

ABSTRACT – Engaging technology in learning theory and skills course is an exciting and interesting process of learning as it is offering learner to learn independently using their self-learning time with an interactive platform. DPK1013: Shorthand 1 is one of Discipline Course in Diploma in Secretarial Science which learned in Semester 1 and 2 which covers 16 theory chapters represent learning a new style or writing using symbols and geometrical structures. This project, called ***ShortApps*: Shorthand for Beginners** builds to examine the potential of learning activities by using Mobile Application for Shorthand Course as well as to create better understanding with the help of technology to boost the interest in learning. It is also to add the supporting reference and material for this course. This mobile application offer a user-friendly menu, interesting and attracting interface with a concise shorthand notes, exercise, audio and video to support the aim of this project as to increase better understanding and interest in learning. The development of mobile application for Shorthand Course also important to facilitate students and lecturers with the access of knowledge that easy to carry with the help of this application. A sample of 186 students participated in a quantitative survey and the data analyzed by using SPSS to see the potential and interest of this application. The results based on descriptive statistics conclude that the perceived ease of usefulness, perceived ease to use, compatibility and intention had a significant positive effect on learners' readiness and motivation.

1. INTRODUCTION

Mobile applications are rapidly growing an importance that can be used for various purposes. It had been used widely in education. With the rapid growth of technology, it has made the learning process become easier. Since the arrival of mobile phones in the 1980's (Huet and Tcheng, 2010), they have been widely use for the whole people of all ages of around the world. [1] So, meaning that the whole world is becoming mobile.

By using mobile technologies in educations, it is clearly shows the example of the new innovation in learning field. Mobile device equipped with the internet connection that have created which called mobile learning (Fu, Su and Yu, 2009). [2]

With the use of internet, it enabled mobile devices can help students to access learning resources and online courses, anywhere and at any time. Many applications have been developed for mobile platforms and been developed for educational purposes (Demuynck and Laureys, 2002).[3] Using mobile apps can helps accomplish an efficiency, while making it a fun way of learning or teaching and it can increased better understanding of mobile apps into classroom and for virtual learning.

By using the mobile applications, it can help students to learn without boundaries, enable collaboration between students and lecturers and they have their own time to study. The study of Vogel *et al*. (2007) aimed to explore the impact of learning performance and the result of this study showed positive improvement for learner performance enhancement.[4]

Mobile applications can help students to take control over their learning it can be optimized inside and outside the classroom. It is also find that mobile applications is beneficial and useful since they can learn quickly in different locations. In addition, the use of mobile apps can change students' thoughts, actions, feeling and skils (Vogel *et al*, 2007).

According to MacCallum (2009) study, it can increased in the satisfaction and motivation of students in online learning environment that are supported by mobile technologies and also the study has proven that motivation give a great impact on how students used the technology for mobile applications because it can improved and enhanced their performance. [5]

2. PROBLEM STATEMENT

Despite the learning process can be learned by using the book as a guide and learning material, but most of the students cannot fully understand the contents of the note and they are tendency shows not interested in learning shorthand using traditional way. There is no learning application for DPK 1013: Shorthand 1, in addition the materials and references used in the course outlines are restricted to notes and books only. Consequently, most of the students show less motivated or fun in learning Shorthand using traditional method because too many topics and theory they have to learn.

In this paper, we analyse students' behavioral intention using mobile applications in learning *Shorthand* course, namely; *ShortApps:* Shorthand for

	No. of Students	%
18 – 19	74	39.8
20 – 21	101	54.3
21 and above	11	5.9
∑	186	100

begineers.

3. METHODOLOGY

Samples; The study was conducted based on a total of 368 students from 11 classes. The samples are among the student from Diploma in Secretarial Sciences, Politeknik Sultan Idris Shah that completed Shorthand Course in Semester 1 and 2. Referring to sample size from Krejchie and Morgan, from this 368 population (students), 186 samples were received and validated.

Design & Development; The application had been developed with the help of Android Studio that display and run via a smartphone to build the prototype model.

Implementation; Students were briefly explained on how to use mobile applications, ShortApps using smart phone. The prototype of application was used by students on smart phone. Students were guided based on the menu appear on the screen. The application begins with home page which listed the content such as introduction, theory, exercises, audio, video and external link to You Tube. Under introduction, it contain about background of Shorthand, the materials used and the instruction for beginners. Theory part consists of strokes, vowels, attachment for hooks, loops, circle s and shuns, also prefixes and suffixes. Meanwhile for audio, students can select recorded audio to practice using word in 30 w.p.m and also suggested external link to You Tube using their own self learning time.

Instrument; The authors used questionnaire as instrument of the study. Online survey was created using Google Form. The respondents rated each open-ended statement on a 5-point Likert scale, with 1 being strongly disagree and 5 being strongly agree. It consisted four main constructs of user acceptance, perceived ease of usefullness, perceived ease to use, perceived of compatibility and perceived of intention. As per demographic part, age and class were included.

Data Collection Procedure: Data collection was conducted among students from December 2018 Session that completed Shorthand Course in one week duration.

4. RESULT AND DISCUSSION

Table 1 show the age of students that participated as respondent in this study. 39.8% among students aged 18-19, 54.3% between 20-21 years old, and above 21 was 5.9%. Table 2 shows the classes that involved in the study from 11 different classes that completed Shorthand 1 courses as studied in Semester 1 and 2. Semester 1 student's shows high participation in this with 13.4% for DSK1A and 14.0% for DSK1B while only 2.7% or 5 students participated from DSK4A.

Table 1: Age

Table 2: Class

Samples	No. of Students	%
DSK1A	25	13.4
DSK1B	26	14.0
DSK2A	16	8.6
DSK2B	20	10.8
DSK3A	19	10.2
DSK4A	5	2.7
DSK4B	15	8.1
DSK5A	13	7.0
DSK5B	21	11.3
DSK6A	13	7.0
DSK6B	13	7.0
∑	108	100

Table 3 and Table 4 were to identify whether students owned a smartphone or not in order to learn using mobile application and the frequency of them using the phone for eLearning purposes. 100% respondents had their own smartphone that enable the activity of learning using mobile application while 42.5% students use mobile phone very often for eLearning purposes.

Table 3: Do you have a smartphone?

	No. of Students	%
YES	186	100
NO	0	0
∑	186	100

Table 4: Usage of Mobile Phone on eLearning Purposes

	No. of Students	%
Never	1	.5
Rarely	5	2.7
Sometimes	33	17.7
Very Often	79	42.5
Always	68	36.6
∑	186	100

Descriptive statistics showed that among the four constructs of user acceptance, usefulness had the highest rating (mean = 15.55), followed by intention

(mean=15.26), ease of use (15.19) while compatibility (mean=15.04) had the lowest rating.

In terms of each item in the construct of usefulness, item 8 had the highest rating whereas item 5 had the lowest one (refer Table 5).

Table 5: Perceived Usefulness

Item		Mean	Std. Deviation
5	Learning Shorthand using Mobile Application is not restricted by time and place	3.70	.909
6	Learning Shorthand using Mobile Application help me access the information I needed	3.91	.868
7	I can enhance my effectiveness on my learning with Mobile Application	3.96	.875
8	This application provides helpful guidance in performing tasks	3.98	.867

In terms of user acceptance in ease of use, they believed learning Shorthand through mobile application can saves time (See item 10) with mean 3.88 while Learning Shorthand using Mobile Application is easy to use had the lowest rating (See Table 6).

Table 6: Perceived Ease of Use

Item		Mean	Std. Deviation
9	Learning Shorthand using Mobile Application is easy for me	3.69	.997
10	Learning Shorthand using Mobile Application saves time	3.88	.917
11	Learning Shorthand using Mobile Application is convenient	3.84	.871
12	Learning Shorthand using Mobile Application is easy to use	3.78	.963

Compatibility refers to the degree to which an innovation (this study) is perceived as being consistent with the existing values and past experiences as according Innovation Diffusion Model theory. This related to users' life experiences in using the mobile application in learning.

Table 7 shows item no 16 had the highest rating with mean = 3.80 while item 13 and 14 scored the same lowest rating of mean = 3.74 .

Table 7: Compatibility

Item		Mean	Std. Deviation
13	To use this application, I do not have to change anything I currently do	3.74	.826
14	Using mobile application does not require significant changes in existing work routine	3.74	.887
15	Using this application is same as using other learning application I have in the past	3.76	.893
16	Learning using mobile application can reinforce from computer	3.80	.899

In term of Using Intention, item 20; '*I will not hesitate to use mobile application in learning Shorthand'* had the highest rating with mean = 3.87 whereas item 19; '*Overall, I will learn Shorthand through mobile application'* had the lowest one (mean = 3.77). (See Table 8).

Table 8: Using Intention

Item		Mean	Std. Deviation
17	I am willing to use mobile application in learning Shorthand	3.81	.891
18	I will continue using mobile application to learn shorthand in the future	3.81	.944
19	Overall, I will learn Shorthand through mobile application	3.77	.920
20	I will not hesitate to use mobile application in learning Shorthand	3.87	.844

Motivation has a great impact on how learners user technology for mobile learning (MacCallum (2009). In Table 9, item 21 and 22 scored highest rating with mean = 3.91 while the lowest rating for question "I *believe I can improve my skills by using the Shorthand mobile application"* as in item 23.

Table 9: Motivation

Item		Mean	Std. Deviation
21	I like to use mobile application to learn as much as possible	3.91	.809
22	I want to use mobile application and attend traditional classroom	3.91	.794
23	I believe I can improve my skills by using the Shorthand mobile application	3.85	.882
24	I believe learning using mobile application has helped me to learn more about the subject	3.89	.825

5. CONCLUSION

This study presents findings on the implementation of a mobile application in learning Shorthand Course. Analysis using the questionnaires answered by the respondents was conducted. The findings show that students perceived ease of usefullness, perceived ease to use, compatibility and intention had a significant positive effect on learners' readiness and motivation in learning Shorthand using mobile application. In future, we will further analyse the effectiveness of this mobile application in learning shorthand course.

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Student's First Experience with Prototype Laboratory Module and Mobile Application Integrated with Augmented Reality

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Keywords: Augmented Reality, Student Learning, Laboratory Module, Mobile Application

ABSTRACT – A prototype augmented reality integrated laboratory module and mobile application was design and developed, with the intention to enhance the student learning experience. The prototype laboratory module designed was integrated with seven instructional videos, which can be accessed using a prototype mobile application with augmented reality scanner function. The mobile application was designed and developed using unity-vuforia platform. The prototype module and mobile application were tested with 39 students from the Diploma in Fisheries during a practical session. To study the effectiveness of the AR course module, students answered an online questionnaire after the practical session. A total of 20 questions was designed to represent 6 variables: engagement and interest, cognitive overload, knowledge acquisition, interdependence, flow and processes, and feelings. All questions were scored based on a 5 level Likert scale. Based on initial findings, 17 questions received positive responses while 3 questions had a mixed response. In addition, a total of 28 written feedbacks were recorded with 24 positive feedbacks and 4 negative feedbacks. The mix responses and negative feedbacks were mostly related to internet access and mobile phone capability related. Based on the positive responses and feedbacks, it can be summarized that the use of augmented reality integrated laboratory module was effective and able to enhance the student learning experience.

1. INTRODUCTION

Currently, the universities are dominated by the generation Z or the digital natives. They are known to be addicted to the internet (20%), play video games (90%), short attention span (8 seconds) and easily bored by traditional lectures in the classroom [1]. Higher learning must adapt to the changing faces their students learning styles, by utilizing adaptive teaching methods and materials. Futuristic learning spaces and technologies promote immersive learning in accomplishing the learning goals, where the best way of learning is through doing and integration [1]. Experiential learning focuses on individuals and can be done through hands-on via technology-enabled learning approaches such as virtual reality and augmented reality [2]. Augmented reality (AR) refers to technologies that project digital materials onto real world objects. The broad definition of AR consists of three characteristics: (a) the integration of virtual objects and the real world; (b) users can interact with virtual objects in real time; and (c) it is registered in three dimensions [3]. Azuma's is currently the most widely accepted definition of AR [4]. The two major categories of AR are image-based AR and location-based AR. The use of AR can be an asset for learning. AR systems allow the learner to interact with the real world in ways that were not possible before. They create new situations that would be impossible to create in just the real world or just the digital environment [5]. AR 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 [6]. 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 [7]. It is highly likely that AR can make educational environments more productive, pleasurable, and interactive than ever before. AR not only has the power to engage a learner in a variety of interactive ways that have never been possible before but also can provide everyone with one's unique discovery path with rich content from computer-generated three-dimensional environments and models [6].

Considering the impact towards learning problems, in a review, the main advantages of using AR are: learning gains (43.75%), motivation (31.25%), interaction (15.63%) and collaboration (18.75%). In addition, AR has been affective for: a better learning performance (53.13%), learning motivation (28.13%), student engagement (15.63%) and positive attitudes (12.50%) [8]. Augmented reality (AR) provides the opportunity for users to interact with computer-generated content from the real world. Educators and technical developers also exploit the capabilities of AR technologies to enable new forms of learning in various subjects Many studies also demonstrated that games can increase motivation and are therefore an essential feature of the lives of children and teenagers [9][10][11][12]. Many educators include AR in games in learning settings

and have transferred learner involvement and energy from games to educational activities [13]. Through instructional games, learners develop higher-order cognitive skills [14].

In this paper, we analyse student's first experience with prototype laboratory module and mobile application integrated with augmented reality.

2. METHODOLOGY

Samples; The study was conducted on 39 students for the course: Water Quality and Soil Management, Semester 02 2018/2019. This is a three credits diploma course for the Diploma in Fisheries program offered at Universiti Putra Malaysia Bintulu Campus.

Design & 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 module was design with simple graphics, organized within a single page. The module is embedded with seven AR trigger images and two QR codes (Figure 1). The mobile application tested to trigger AR content during this study was HP-Reveal. While the main mobile application intended to be developed will be based on Unity-Vuforia platform.

Implementation; A total of 39 students participated in the testing the testing exercise. The students comprised of 41% male and 59 % female. The students' age ranged from 18 to 21 years old with a majority aged 19 (74.4%). All the students experienced AR for the first time.

Instrument; A 20 questions questionnaire was designed to access the student's first impression, learning experience and feedbacks on AR course module [8][15][16]. 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 (Table 1).

Data Collection Procedure: 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.

3. RESULT AND DISCUSSION

Table 2 shows the overall response from students based on the six variables. The general feedback for the engagement and interest variable was positive. Overall, students agreed (average 78.22%) that AR improve their engagement and interest. Three questions shared the highest percentage of positive scores (79.50%), where students agreed that using AR was fun, increased their interest about the subject and made learning easier from them. A high number of students also indicated that they prefer using AR for learning (71.80%) and made learning experience more engaging (70.8%).

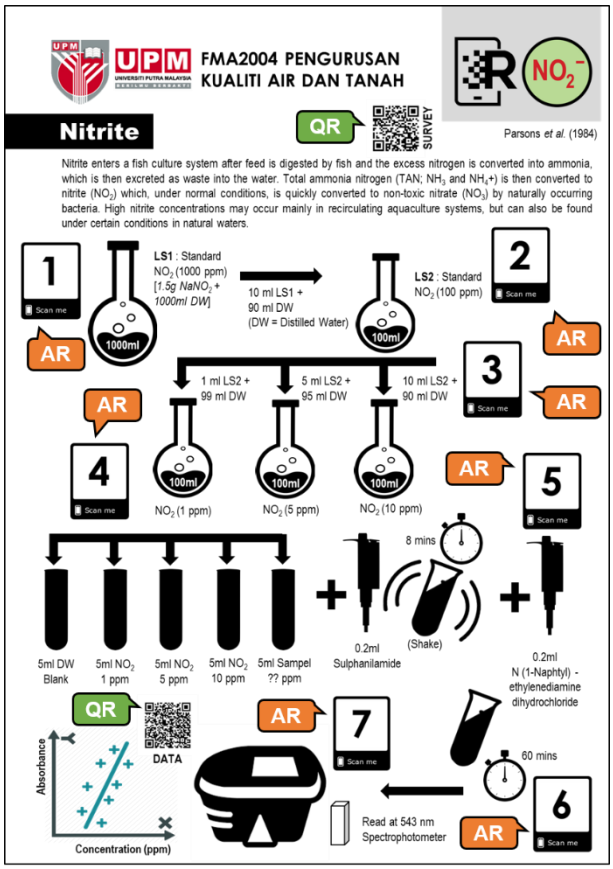

Figure 1: Prototype water quality course module embedded with seven AR image and two QR codes.

Table 1: Design of online questionnaire

Variable	Questions	Scale
1. Engagement & Interest	1 I am more engaged with learning through using AR.	Likert Scale 1-5 Strongly Agree-5 Agree – 4 Neutral -3 Disagree- 2 Strongly Disagree-1
	2 Using AR was fun.	
	3 I prefer using AR to learn.	
	4 I am interested to know more about this subject.	
	5 I could learn about the concepts with less effort.	
2. Cognitive Overload	6 I learn so much information.	
	7 There is too much information to process.	
	8 It was tough to learn the technology.	
	9 Solving problems using AR is too exhaustive.	
3. Knowledge Acquisition (Cognitive)	10 I gained more knowledge using AR.	
	11 Using AR enhances my concentration.	
	12 I remember the basic concepts that was being taught.	
4. Interdependence	13 This project enhances our communication with our teammates to solve questions.	
	14 This project enhances working together with teammates to solve problems.	
5. Flow and Processes	15 I was difficult to navigate through the process.	
	16 I had no problems to understand the instructions.	
	17 I was able to follow the steps easily.	
6. Feelings (Affective benefits)	18 It was rewarding to be able to solve the problems using AR.	
	19 This AR module gave me a sense of enjoyment.	

Table 2: Overall student response based on variables

Variables	Percentage		
	Positive	Neutral	Negative
1. Engagement and Interest	78.22	12.80	8.98
2. Cognitive Overload	39.72	27.80	32.48
3. Knowledge Acquisition	71.80	19.63	8.57
4. Interdependence	78.20	14.10	7.70
5. Flow and Processes	58.97	24.77	16.26
6. Feelings	76.07	14.50	9.43

Overall, a high percentage of students experienced cognitive overload (32.48%). The elements of cognitive overload were exhibited where students indicated that there was too much information to process (58.90%). The question about the using AR to solve problems received a mix response from the students. While majority of students indicated no difficulties to solve problems using AR (41%), a high number of students also indicated that it was exhaustive to solve problems using AR (33%).

Students agreed that AR improved their knowledge acquisition (71.80%). Within this variable, the highest percentage of students agreed they gained more knowledge using AR (74.40%). Students also agreed that using AR enhances their concentration (74.30%). A lower percentage of students agreed that they remember the basic concepts of the experiment (66.70%).

Overall, students agreed that AR improved their communication and teamwork (79.1%). Within this variable, the highest percentage of students agreed using AR enhances their teamwork (81.5%). Students also agreed that using AR enhances their communication among teammates when engaging with AR content (76.9%).

In general, the students exhibited a mixed reaction base the flow and processes variable. Overall, students were able to track the flow and processes when engaging with AR content (58.97%). Students indicated that they were able to follow the steps easily (74.4%) and had no problem understanding the instructions (71.8%) when engaging with the AR module. The question navigating difficulties using AR received a mix response from the students. Majority of students indicated having difficulties to solve problems using AR (35.9%), while another high number of students being neutral (33.3%). Only a small number of students had no difficulties navigating AR (30.7%).

Overall, students felt enjoyment, rewarding and success engaging with the AR content (76.07%). Within this variable, the highest percentage of students had a sense of enjoyment (82%). Students also agreed they felt rewarding (71.8%) and success (74.4%) when they navigated with the AR content.

Figure 2: Reconstructed word cloud representing the comments and feedback from students after engaging with AR content

In the last section of the questionnaire, students were encouraged to express their feelings and give personal feedbacks with their own words after the process of experiencing with AR content. A total of 34 students gave their comment and feedback in the questionnaire, out of which were mostly positive (82%). In this section, the responses are gathered and sorted to differentiate positive and negative comments and feedback from the students, then the important descriptive positive and negative words that highlight the experiences are reconstructed into a word cloud (https://www.wordclouds.com). With reference to the positive comments and feedback cloud, the overall experience by students can be expressed as easy, fun, enjoyable, engaging, interesting, new-experience and easy to understand (Figure 2). The main negative experience by students can be referenced to the problems with internet connectivity, no access to mobile data or wifi.

4. CONCLUSION

Base on the findings of the six variables of learning experiences, it can be concluded that the use of AR was able 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.

Nevertheless, some students experience certain levels of cognitive overload, and the problems were listed out in their feedbacks. The main issue that lowered the AR experience and caused some cognitive overload were related to internet connectivity. This problem was enhanced by the fact that HP Reveal AR experience requires internet connectivity to work. While majority of students had no problems with internet, students without internet had to rely of other students and had a much less involvement, and their frustrations can be seen in the findings and feedbacks. The information gathered from the students was very important and useful for further design and development of the projected applications to be constructed.

Based on the good response from students, the project will continue to design and develop an own prototype AR scanner, based on unity platform (https://unity3d.com). The product will be a standalone mobile application that can be downloaded in any mobile device and able to scan all augmented reality trigger images designed in the course module. The application will be able to work without internet connection and this feature will be able to solve the problems of internet connectivity experienced by the students in this study.

5. ACKNOWLEDGEMENT

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Embedding AR Application in the Retailing Classroom

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Keywords: ***Augmented Reality (AR), retailing, AR Application***

ABSTRACT – By augmenting the real world with virtual information, Augmented Reality (AR) provides new possibilities for education. It is a new medium yet being explored in the education industry. Using Augment, one of the AR application used in the classroom makes retailing class more interactive as well as creating a better engagement with the students. With the using of the handheld devices as a tool in implementing the application, it facilitates the teaching and learning process. This paper provides the significant of embedding AR application in the retailing class, removing all the obstacles of handling a physical real retailing store site.

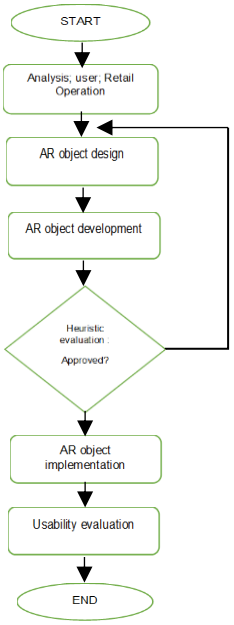
1. INTRODUCTION

Rapid growth of the technology advancement significantly influence every aspect of human lives including education. Augmented Reality (AR) plays its role in fulfilling the demand of the technology era. Young generation are digital natives who are using the technology as part of their lives. Over the past decades, most research in AR has emphasized on the AR definition. Basically AR is blending real and virtual information in a real time by displaying 3D virtual image and real objects [1]. Previous research have reported that by embedding AR into the teaching and learning process provides numerous benefits to the learners as it is able to create interactive and pleasurable environment [2]. This view is supported by the past researcher which is the AR based learning environment promotes the learners' motivations as well as the exposing them to the hands on ability [3]. Furthermore, the learners are also able to develop their skill and knowledge as well as enhancing the teaching and learning process in an interactive way [4]. In a study which is set out to determine the applications of AR in a classroom is gaining the educators' attention in the future. Augment is one of AR applications that can be used in a classroom. The application is a tool specializing in AR presentation and modelling projects. Rapid evolution in handheld devices wide spread the usage of AR applications in the classroom as the ability of AR in delivering the content efficiently [5]. The evolution on the handheld devices technology has make it accessible and affordable to the students. AR applications is using in the retailing classes such as Retail Operations classes because it requires the students having good imagination and good engagement with the subject as it incurred technical aspects in retail. In addition, a ratio for a lecturer and student is getting bigger as the number of the student is increasing. Student to faculty ratios must be a good number since it show the effectiveness and the efficiency in the teaching and learning process. However, it will incurred higher cost to the faculty if they strictly practiced the good ratios.

2. METHODOLOGY

Implementation; The students' needs to download the Augment applications in their handheld devices such as smart phones, PDAs and tablets with cameras. They needs to capture the real image into the application. As part of the coursework assessment, the student needs to do project on display the product in the store. The students will be assessed with some elements of good atmosphere of retail store. The project will be a group project. The design of the project is based on the problem based learning. Problem based learning is more promoting on self-directed learning, self-motivation, problem-solving tasks, and knowledge application skills [6]. Problem based learning is emphasizing on the task which is to assess the student's ability in performing the tasks and either understand well the concept learned or not. The diagram below explains how AR application flowchart embedded in the Retail class;

Figure 1.0: AR application flowchart process for Retail class.



3. EXPECTED RESULT AND DISCUSSION

This study aim at practicing a new tool in conducting Retailing classroom; AR@Retail Apps. The application of the AR can be applied in the education process as a didactic tool in executing classes in higher education. It is able to sustain the students' attention and interest to the retail course while in the same time facilitates the teaching and learning process. On the other hand, the idea of using new technologies which represent the everyday life of this generation helps in keeping the students' engagement. This benefit is about new ways of interaction with the learning tool, through concepts such as context-aware information on the device. In addition, the interactivity also will be increased compared to the traditional class. It will also engage the students with the content, and allow for knowledge to be acquired through student's own manipulation of content as supported by constructivist learning theory. Through application of AR in the Retail Operation class it is also improved student centered learning approaches where the students are more responsible for their own progress in education, and the educators act as facilitators who enable the students to learn independently and individually.

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Tool in Screening Visual Perception Problems: Autism Kits

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Keywords: Autism, serious games, visual perception

ABSTRACT – 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 for providing students with new opportunities. Students with disabilities should be provided with opportunities to realize their potential. Results positively shown 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.

1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a developmental disorder, characterized by social difficulty in communication and interaction with others and (ii) repetitive behaviors. A reported 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 dis-orders [8]. According to Howlin et al. [1], the number of diagnosed autistic children is increasing. Wan and Hisham [2] stated that autism cannot be detected from birth, and only when the child is around 18 months of age, then, a brain disorder could be detected [3]. They love to interact with technology and video games and become attached to a particular interest like dinosaurs, trains or outer space [6]. Children with ASD symptoms have more learning problems and other developmental delays [7]. They often have difficulties in recognizing, remembering, organizing and interpreting visual images like written or pictorial symbols for learning [4][9].

The signs of ASD are usually evident in early childhood. Though it is still considered a lifelong diagnosis, 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 [4]. 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 [5].

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-today teaching and learning practices in school [10]. Students enjoy learning and the independent inquiry which innovative and appropriate use of ICT can foster [10].

2. METHODOLOGY

Samples; Participants were ten (10) autistic students and five (5) special education teachers. The experiment was conducted at SEAMEO SEN Regional Centre for Special Education, Melaka, Malaysia.

Design & Development; The work processes involved in this phase such as design of Autism Kits screening content, storyboards and flow chart. Selection of game genres and types of games that are suitable for the screening of visual perception problems.

Implementation; All the modules and elements were incorporated to produce the final ready-to-use product.

Instrument; Autism Kits that covers five (5) games which is Game 1 (Visual Discrimination), Game 2 (Spatial Relationship), Game 3 (Form Constantly), Game 4 (Form Visual Memory) and Game 5 *(*Visual Closure). Total marks for courseware is 100%.

Data Collection Procedure: Data collection was conducted at SEAMEO SEN, Melaka. The pre-test used the Visual Perception Diagnostic Test Instrument used by the Special Education Department, Ministry of Education

Malaysia (VPTDI-MOE) whereas the Post-test used the Autism Kits.

3. RESULT AND DISCUSSION

The weaknesses of the teachers conducting the visul perception diagnostic tests because of lack of knowledge and experience in managing and producing student diagnostic reports. Furthermore, the approach of manual diagnostic tests instruments including the one developed by the Division of Special Education, Ministry of Education Malaysia (MOE) is static and not interactive. The instrument does not attract the attention of students, especially medium and low level functioning autistic students. Although there are visual diagnostic instruments from overseas, these do not meet the syllabus content prescribed by the MOE.

Table 1 shows the score and level of Vi-Per Games diagnosed with 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 differ for each phase. 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 were evaluated based on the scores obtained.

Table 1 shows games score and level.

Score	Level
1-3	Weak
4-7	Average
8-10	Good

All scores obtained from all five (5) games were calculated then totalled based on the percentile scoring system. This scoring system is one of the methods that are suggested by [1]. Table 2 displays the diagnostic result, which is based on the result of the percentage score.

Table 2 shows diagnostic score level.

Score	Level
0-29	Low
30-79	Medium
80-100	High

4. CONCLUSION

This project can be early detection tools to screen visual perception problems. The results show that the use of Autism Kits successfully assist and facilitate teachers when making a screening of visual perception problems in autistic students. The use of the tool successfully assist and facilitate teachers when making a screening of visual perception problems in autistic students, compared with conventional methods of diagnosis. Besides that, it can contribute to the society by humanizing the innovation and technology through Higher Education 4.0 especially special education itself. For future work, our intention is to develop autism level identification by using serious game to identify high functioning, medium functioning and low functioning of autism children.

5. ACKNOWLEDGEMENT

Authors would like to express deepest gratitude towards Universiti Teknikal Malaysia Melaka (UTeM), Center For Research and Innovation Management (CRIM), Centre of Technopreneurship Development (CTeD), Innovation & Sustainable Technical Education (ISTE) and everyone who have helped and participated in this study. Thanks for sponsor the publication fees from Research Grant PJP/2019/CRIM (3D) S01686, Universiti Teknikal Malaysia Melaka (UTeM).

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Instructional Video Clips as Flipped Teaching Approach in Mechanical Engineering Laboratory: Student Perception

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Keywords: instructional video, student perception, flipped learning

ABSTRACT – An innovative flipped teaching strategy is presented for BMCG 1011 Mechanical Engineering Laboratory 1 using video clips to improve practical learning process. The strategy is composed of instructional video clips that can be freely viewed by the students on a mobile device before or in situ during the laboratory sessions. The traditional follow-the-steps instructional manual was replaced by video clips presenting the details guidelines for each laboratory session. This paper analyses students' perception in using instructional video clips as a flipped learning approach to learn the mechanical laboratory techniques and instrumentation.

1. INTRODUCTION

Laboratory practise is the fundamental to any engineering curriculum. BMCG 1011 Mechanical Engineering Laboratory 1 is a compulsory subject for Mechanical Engineering undergraduates in Faculty of Mechanical Engineering (FKM), Universiti Teknikal Malaysia Melaka (UTeM) to develop knowledge and skills of instrumentation, equipment and mechanical technique. The current practice is the students are provided with written laboratory manual uploaded in ULearn platform. It is always followed by instructor's briefing at the beginning of each laboratory sessions to ensure that the students understand to conduct the experiment and the correct way to handle the instrumentation.

In the era of smartphones and video streaming, instructional educational video clips have significantly taken over the traditional approach [l]. The emerging educational innovation of flipped learning approach had significant impact to the way students' learning. It was found to promote active student involvement in the classroom as well as laboratory [2-3]. The video clips prepare the students to review the laboratory sessions at their leisure time and improve laboratory skills, students find it helpful in electrical machines [4]. Previous studies found that the flipped learning using video clips is an effective learning tools as it allowed them to improve the students' performance, motivation and knowledge before their laboratory sessions [5-6].

To keep up with the preferred learning styles, video clips are introduced as innovative instructional to the students. The main idea to use instructional video clips to promote active learning from the students before their mechanical experimental sessions so students can learn at their own pace. In this paper, we analyse students' perception using instructional video clips as flipped learning approach in learning mechanical laboratory techniques and instrumentation.

2. METHODOLOGY

The study was conducted on 88 first year students that currently enrolled in BMCG 1011 Mechanical Engineering Laboratory 1 course in Semester 2, 2018/2019. It consists of nine laboratory experiments. Table 1 shows the implementation detailed for each laboratory experiments. Written manual was uploaded in ULearn for all experiments and instructional video clips link in YouTube were supplied for six experiments.

Table 1 Type of instructions for laboratory sessions.

Item	Experiment title	Lab	Instruction
L1	Microstructure Examination	Materials Lab	WM
L2	Heat Treatment of Steel	Materials Lab	WM
L3	Static Equilibrium-Moment	Static Lab	WM
L4	Axially Loaded Members 1	Static Lab	WM + VC
L5	Coefficient of Static Friction	Static Lab	WM + VC
L6	Determination of Gravitational Acceleration	Static Lab	WM + VC
L7	Young's Modulus	Static Lab	WM + VC
L8	Free Fall	Dynamic Lab	WM + VC
L9	Accelerated Rotational Movement	Dynamic Lab	WM + VC

WM- Written manual; VC- Video clips

Students were encouraged to prepare themselves before each experiment sessions by reading the laboratory manual or watching the instructional videos at their leisure time. A preliminary survey was conducted to gather the students' feedback on the effectiveness of instructional video clips after they conducted each

laboratory session. The number of views for each instructional videos were recorded on 3rd May 2019. Some students have not conducted the experiment yet as they take turn to do the experiments.

3. RESULT AND DISCUSSION

The instructional videos were implemented as a flipped teaching by the course coordinator to support the face-to-face learning conducted by the laboratory instructors and assistant engineer. The total number of students register for this course is 167. However, only 88 students participated in the survey.

Figure 1 shows the number of students regarded the viewed instructional videos as easy to understand and provided the most detailed instruction. Findings show that instructional video for L8 Free fall experiment is the easiest to understand and the most detailed instructions whereas L9 which is Accelerated rotational movement is the least difficult and least detailed instructions. Other instructional videos have almost similar feedback from the students.

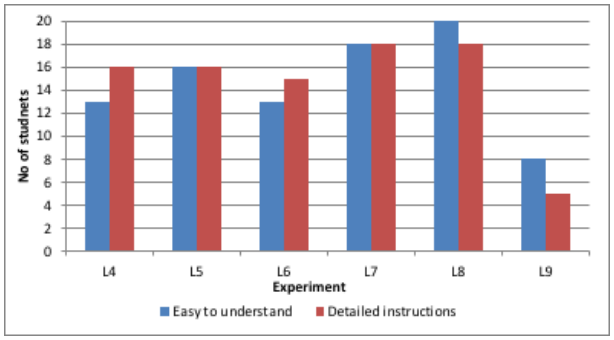

Figure 2: Feedback for each instructional video.

This finding is consistent with the number of views from YouTube channels as tabulated in Table 2. Table 2 shows that L8 has the least views despite only half of the students already conducted the experiment. On the other hand, L9 has the least views because the experiment will only take places after the mid semester break. This finding is further supported that L4 and L6 have shown the highest number of views compared to other experiments. This result is parallel with the feedback from students that L4 and L6 were less easy to understand, hence they need to view the videos more than once.

Table 2: No of views for each instructional video.

Experiment	No. of views
L4	175
L5	142
L6	162
L7	108
L8	82
L9	78

Table 3 shows the overall feedback from the students on the instructional video. The preliminary results shown positive findings that 100% of the students agreed that the instructional video clips have helped them understood the experimental procedures. However, only 51 students agreed that the instructional videos give complete instructions on the experimental procedures. Thus 70.45% students disagreed that the instructional videos can replaced the written manual. Since the students are not yet completed their experiment sessions, these findings are not conclusive yet. The results might be different at the completion of semester. There are rooms for improvement for the instructional videos to completely replaced the written manual.

Table 3 Preliminary feedback for instructional videos.

Feed back	Instructional videos help to understand the experimental procedure		Instructional videos give a complete instructions		Instructional videos replace the written manual	
	No. of Students	%	No. of Students	%	No. of Students	%
Agree	88	100.00	51	57.95	26	29.55
Not agree	0	0	37	42.05	62	70.45
∑	88	100.00	88	100.00	88	100.00

4. CONCLUSION

This study presents findings on the implementation of a flipped learning approach in learning mechanical engineering laboratory skills from the students' perspective. The findings shown that the instructional video clips improved their understanding on the experimental procedures. However, the quality of the videos should be improved to detail every steps and experimental procedures and impact of the instructional videos on the students' performance.

5. ACKNOWLEDGEMENT

This research is conducted by instructors of BMCG 1011 Mechanical Engineering Laboratory 1, Fakulti Kejuruteraan Mekanikal, Universiti Teknikal Malaysia Melaka (UTeM).

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Role Playing in Blended Learning: Strengthening Student Engagement and Sustained Learning in Classroom

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Keywords: Role play, case study, blended learning, classroom

ABSTRACT – Malaysian students these days are lacking critical thinking skills. A combination of blended learning and traditional learning technique (role play) is an effective learning platform to allow students to collaborate, work on problems and creatively find its solutions. This study analyses students' engagement in learning Organisational Behaviour using role play in blended learning modes. Results show these learning approaches have positive impact on improving students' academic performance and their full engagement towards the subject learned.

1. INTRODUCTION

Malaysia is moving towards globalised online learning that harness technology-enabled innovations and education which bridges personalised learning experiences to all students to become highly skilled and competitive employee in future. Teachers are playing a vital role in preparing students for adopting new challenges in order to suit with the Fourth Industrial Revolution (IR4). Three types of learning approaches namely active learning, project-based learning, problem-solving and inquiry with opportunities to engage with the real world should be a practice in the country (Zakaria, 2017). Today, students are given the freedom to customise their learning process through blended learning. Therefore, the undergraduate is now a virtual commodity and must up to meet the needs of an ever-changing world.

A blend of online and face-to-face role playing modes can contribute to a successful and highly enjoyable learning experience and to support intense engagement in the activity.This study aims to promote higher quality programmes that use experiential and technology-enabled learning models to offer more personalised and engaging learning experiences that push the limits of student's potential and motivation to learn in a more dynamic and interactive fashion lecture-style format. It is also providing students with opportunity to creatively interact with their peers and increase their passionate interest in the subject matter itself.

2. METHODOLOGY

Students who took the Managing Organisational Behaviour subject were assigned to create a case study based on the topics given and performed face-to-face role play in the classroom. Online group discussion board (Padlet), and online questionnaire (Google form) were used to examine the effectiveness of role play techniques. Subsequently, an educational game-based platform, Kahoot! was introduced to the students before and after the role play for interactive learning activity by answering questions individually.

Online data collection from Padlet, Kahoot! and Google form on the effectiveness of role playing technique were also collected and analysed.

3. RESULT AND DISCUSSION

In Figure 1, the finding shows there is an improvement on students' quiz results before and after the role play. Before the role play, only half (55.57%) of the questions were answered correctly compared with after the role play results, which the percentage is highly increased, 74.44%. It shows that the students have positive learning attitude and understand well after the role play in the classroom.

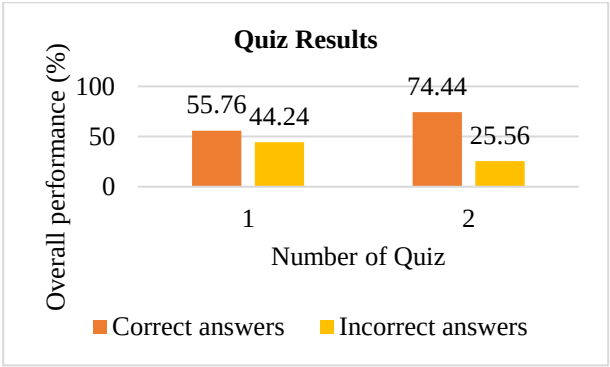

Figure 1: Overall performance of students' quiz results Before and After the role play.

Figure 2 shows that the learning tools used in this subject are useful for revision as an overall. The students feel that Kahoot! is the best learning tool for revision (62.8%) because students can use their own devices to

make group learning fun.

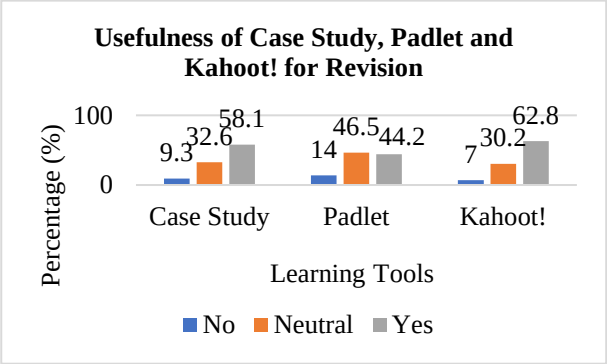

Figure 2: Usefulness of case study, padlet and Kahoot!.

Figure 3 shows that 60.5% of the students agree that role play is an effective learning technique.

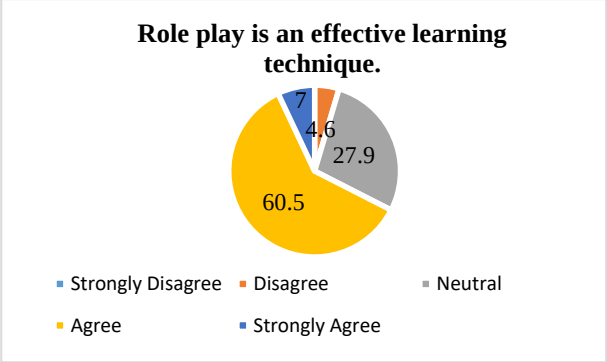

Figure 3: Percentage of students' agreement on whether role play is an effective learning technique.

Overall, the results show that students reach a better understanding of the topic and it leads to sustained knowledge and positive learning attitudes through increased interaction with the materials and with their peers.

Students also mentioned:
"I can understand more about how the environment in workplace looks like."

"I feel very shy during the role play process but I found role play is an interesting learning structure."

"…It allows me to explore realistic situations..."

"It's quite fun on acting role rather than traditional presentation"

"These activities allow me to think critically when I attempt the questions."

"It helps us to understand well because we are able to get into the situation by reading the case study."

"I have learnt the methods how I can apply the knowledge and skills that have studied before into my real life situation especially in the workplace. Besides that, I have also learnt various types of techniques on how to manage the company's employees."

4. CONCLUSION

This innovative blended online and face-to-face role play enable effective collaborations among students, allowing them to contextualise learning within their learning experience as well as increase their enjoyment at the same time. It has facilitated student's skill development and motivation to learn more. It also cultivates student's creativity, critical thinking, communication and problem solving, personal and social competencies, which in line with Malaysia Higher Education Blueprint 2015-2025 that aims to prepare future-proof graduates ready for Industrial Revolutions 4.0.

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e-DeenBot: Modelling a Q&A Chatbot for Increasing Learner Engagement in a Life-long Learning Course

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Keywords: e-Learning, Q&A Chatbot, Life-long learning, learning engagement

ABSTRACT – As people grew older, we need to keep on building our knowledge and acquiring new knowledge. A preliminary study was conducted involving participants to understand the existing problem and define the user requirement. Later, an affinity analysis was performed on the data collected. The analysis result was then translated into a model called e-DeenBot which design was and developed using WordPress and AWS (Amazon Web Services) Lex with Question and Answers (Q&A) chatbot. Finally, the evaluation has made learner engagement is measured to find out the effectiveness of the model.

1. INTRODUCTION

Learning is a process of knowledge, behaviour, abilities, values or preferences being acquired. According to [1], there are different forms of learning, including formal, informal and non-formal. For formal learning is an intentionally planned learning activity while non-formal learning forms through intentionally planned activities; and the informal without planning is unintentional.

In addition, there are several definitions of engagement with active participation and cognitive investment in the context of learning. Referring to [2], five engagement factors are active and collaborative learning, student faculty interaction, supportive campus environment, enriching educational experiences, and the level of academic challenge. Currently, have two approaches to measuring learning engagement. First, the survey approach to identify low-engagement individual learners who may be at risk of dropping out or failing. Means that the results are not sufficiently timely to flag and interfere with individual learners at risk of failure. Second, the engagement analytics approach builds on techniques such as website tracking tools and data mining that are used to monitor and enhance website usability. Hence, engagement is a core concept in the process evaluation of higher education quality [3].

Moreover, the interactive chatbot has become quite common now, with multiple sites and applications using a variety of chatbots, ranging from customer service agents on e-commerce sites to Apple's Siri and Amazon's Echo. Consequently, the chat bot's function is to interact with users, answer their questions and address their concerns [4]. The experience this chatbot provides is better than static delivery of information, such as a list of frequently asked questions (FAQs), because the chatbot offers more interactive delivery of messages to users, specifically responding to their questions.

The Life-long learning is embedded in educational and occupational careers [5] also opportunities are readily accessible through the hybridization of digital learning contexts from formal to informal in today's globally networked knowledge society [6].

Therefore, life-long learning requirement becomes crucial with the rapid advances of technologies. Knowledge obsolescence has become a crucial problem. Life-long learning needs to be our culture to keep us relevant, competitive and survive in the smarter world. Online learning provides various platforms such as Massive Open Online Course (MOOC) & Open Education Resources (OER) as a solution to life-long learning needs. However, learning online is reported as boring, lack of engagement and very low completion rate [7].

2. METHODOLOGY

Rapid Prototyping (RP) methodology was used to develop the e-DeenBot. Rapid prototyping involves the development of a working model of an instructional product that is used in a project to aids in the analysis, design, development, and evaluation.

Rapid Prototyping method consists of four main components that needed to follow. There are planning, building, testing, and deploying. In the planning phase, it involves the process of student-faculty what the requirements for make engagement of e-DeenBot, the software will be used to build, what are the research questions and the affinity analysis is doing based on the user requirements.

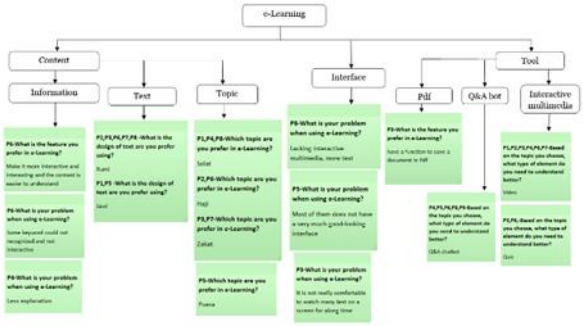

Figure 13: Final Affinity Analysis Diagram

Planning also involves designing the user interface and user experience based on affinity analysis. This phase also involves sketching a paper prototype to show how the interfaces, the design of the content of the e-DeenBot and how its work. The planning phase is vital as it will gather all user requirements that can help developers in developing e-DeenBot.

The second phase is building. In this phase, we will first build a working prototype based on the sketch in a paper prototype. The e-DeenBot builds by Amazon Web Services (AWS) Lex and will have question and Answer (Q&A) chatbot. The requirement will be based on the user opinion on affinity analysis.

The third is testing where will test the working prototype with a group of users to test whether the e-DeenBot has fulfilled their requirement or not. During this phase also, we can fix the shortage of interface, the design of content and user experience based on the user evaluations.

Deploying phase involving of deploying the e-DeenBot to the user but in the meantime, do an evaluation from time to time in order to improve the application in the future update.

Figure 14: Deploy Q&A chatbot on Website

3. RESULT AND DISCUSSION

E-DeenBot is expected to increase learner engagement in a life-long learning course that help people, especially Muslim, in learning basic Islamic pillars such as Solat, Zakat, Haji and Puasa.

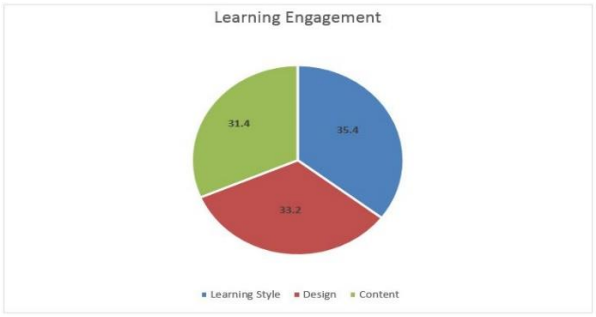

Figure 15: Evaluation Survey

Learner engagement of e-DeenBot has been measured in three-part which is learning style, design and content. Furthermore, learning style has given the higher percentage to increase learning engagement followed by the design and the content.

Other than that, in behavior element part, there are 100% agreed that the e-DeenBot has increase learner engagement and it is recommended learning medium for user come back to visit and learn. From that, it claimed that e-DeenBot was helpful and very recommended to use.

Table 6: Percentage of Learner Engagement

Learner Engagement	Mean	Percentage %
Design	3.32	33.2
Content	3.14	31.4
Learning Style	3.54	35.4

4. CONCLUSION

This study presents findings on increasing learning engagement on Q&Abot for life-long learning course.

5. ACKNOWLEDGEMENT

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Improving Students' Speaking Skills Using a Conversational Robot in Mandarin Course

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Keywords: Mandarin, Chatbot, speaking skills

ABSTRACT – Real advancement in language learning comes by practicing. Online language learning are rarely holistic educational tools. To really learn a language, equal attention has to be given to vocabulary, grammar, reading, speaking, writing, and listening, which many on-line courses do not support all of these. Majority of language learners may agree 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. Developing an on-line language learning such as MOOC is a challenging effort. Our preliminary study on 38 students showed that self-efficacy in speaking competency level was only 41%. To overcome this, we proposed an intelligent conversational robot for students to practice in improving Mandarin speaking skills to complement language learning via Mandarin MOOC. This project aims to provide a new tool, called MandarinBot, for students to practice improving Mandarin speaking skills which 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 learners can go on practicing until they can speak their intended phrase correctly. The chatbot is designed by using Amazon Lex, Translate, and Transcribe that combine intelligent conversational robot ability with Mandarin to English (speech to text) and text to speech. Having the MandarinBot it is hoped that the learners would improve their Mandarin speaking skill ability.

1. INTRODUCTION

People actually learn from each other and learning happens when people generate information through observation, imitation, and modeling [1]. Our Mandarin MOOC has been designed according to Bandura's key principles of Social Learning Theory [2][1][3] and Spencer's [4] recommendation on ways in using technology to implement a social learning strategy in e-learning. Spencer 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 & past reinforcement, 2) Memory – includes people retention and reproduction ability, and 3) Motivation – which cause people to imitate what they learned.

Real advancement in language learning comes by practicing. Online language learning are rarely holistic educational tools. To really learn a language, equal attention has to be given to vocabulary, grammar, reading, speaking, writing, and listening, which many on-line courses do not support all of these.[5] Majority of language learners may agree that they need to speak to really learn a new language. Language expert also 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. [6] Developing an on-line language learning such as MOOC becomes a very challenging effort.

In this paper, we propose a model for improving Mandarin speaking skills via a conversational robot to support learners in MOOC language learning.

2. METHODOLOGY

Samples; A preliminary study was conducted to 38 students that measure students' self-efficacy for speaking ability in Mandarin course. The course implemented a blended learning approach by using a Moodle-based learning management system. Results showed that self-efficacy in speaking competency level was only 41%.

Design & Development; After realizing the problem, we develop Mandarin MOOC that applies social 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

Key principles of Social Learning Theory	Social Learning Strategies applied in Mandarin MOOC learning design	Remark
Observational Learning	Lecturer Video	14
	Dialogue Video	24
	Language Clinic (Video Conferences)	2
	MandarinBot (Chatbot)	1
Memory Retention	Interesting Forum	12
	Mini Project	1
	Knowledge Sharing	1
	Peer-to-Peer Activities	1
	Slide	12
Motivation & Reward	Credit Transfer	Yes
	Certificate of Completion	Yes
	Badges	Yes
	Points/Marks	Yes
	Bonus Points	Yes
	Progress Checklist	Yes

As a continuous quality improvement effort to our Mandarin MOOC course, we also proposed the design of the MOOC course with an intelligent tutoring system called MandarinBot as part of the Observational Learning strategy.

3. RESULT AND DISCUSSION

MandarinBot Architecture; MandarinBot is a new tool introduced for students to practice improving 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 learners can go on practicing until they can speak their intended phrase correctly. The chatbot is designed by using Amazon Lex, Translate, and Transcribe 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. When learners are practicing to respond with the correct pronunciation, they are prompted with hints in the form of images or video to assist them in speaking.

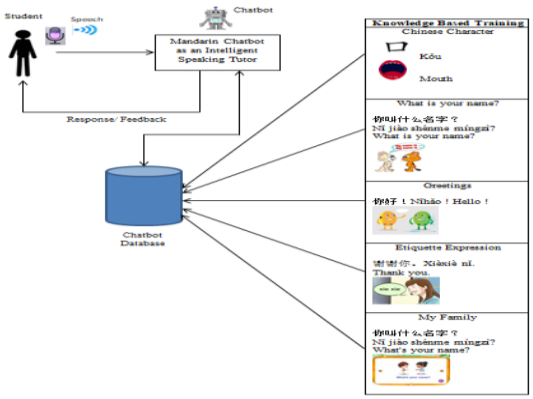

Figure 1: Architecture of MandarinBot Speaking Tutor

4. CONCLUSION

This study presents a MOOC language learning model that implements social learning strategies and a conversational robot for improving language speaking skills.

5. ACKNOWLEDGEMENT

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Gameful Design: Preliminary Study on Game Elements Apply in Gamification MOOCs

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Keywords: gamification, MOOC, engagement, online learning

ABSTRACT – Massive Open Online Course (MOOCs) is introduced as a type of E-Learning to enhance both teaching and learning. This paper addresses the designing of gamification in MOOCSs. Gamification is design as a tool which currently introduced as a new approach to enhance present MOOCSs and increase engagement between students and learning application. The game elements resulted in literature review for this study are level, progress bar, leader board, avatar, rewards, badges, points, emoticon feedback and mission. This paper presents the preliminary study on which game elements to be used in gamification MOOCs. In addition, many studies have proved the effectiveness of applying game elements and using conceptual of gaming in learning. In future study, game elements defined will be implement and identify its successful in building positive impact to learning.

1. INTRODUCTION

Gamification believes to improve and motivate learners with learning [1]. The use of game design has raised a lot of interest in many sector such business and academy [2]. Gamification had also shown positive impact on student engagement, affect and learning outcomes [3]. Learners were more actively involved and improved their test scored of game show-style approach in undergraduate business course [4]. This because of gamification also implies a social game and interaction with other participants. While game nowadays has fairly known becoming part of learners' everyday life. Instead of using it during leisure, also been used in few industries such as defense, education, scientist exploration, health care, emergency management, city planning, engineering, religion, and politics [3].

While, Massive Open Online Courses or MOOCSs refer to an online learning which is a web-learning platform that allow an unlimited number of students or learners to access substance and contents regardless of place and time. MOOCSs provide various high-quality educational materials for learners internationally. Various platform of MOOCSs are launched with open free-access features and few of them are with subscription-access in the past decade. Among with the popular MOOCSs are EdX, Coursera, Khan Academy and Udemy [6]. Other than focusing on learning materials provide, learners also able to access with the learners-educators' community in the MOOCSs. An interactive user forums is providing to support community interactions among MOOCSs users. However, even varieties of MOOCs are introduced, it still encounters with conflict of engagement issues. Addition, motivation and engagement become the common problem nowadays [20]. This MOOCs then is developed by adapting gamification in MOOCs which purpose to provide interactive, creative, and interesting learning content, with the integration of game elements that are used for teaching and learning [33]. In words, gamification is implement in MOOCs to supporting and improving the current MOOCs.

This paper initially outline the importance of applying gamification concept with few of game elements. Hence, this study aimed to propose which game elements to apply in gamification MOOCs. On deciding the game elements, four phase are created with two different methods. All then are discuss in findings and discussion sections.

2. RELATED WORKS

A. Gamification

Based on statistic report by The Statistics Portal of May 2017, the highest world-wide average age of game players is 21-35 years followed by age group of 36-50 years. Both age group mentioned, can be categorized as the group age of higher education. In other words, learners are spending a lot of time to play games. According to a report in The Malaysian Reserve (TMR), Malaysian gamers generated US$589 million (about RM2.45 billion) in 2017 while, Americans spent over US$25 billion (about RM103.66 billions) on video games in 2010 [2]. Seeing the large amount of money spent, here can clearly see that there are huge impact and player loyalty on spending their money on game, hence learning should follow the motivational elements in game to ensure learning will progress parallel with the engagement of video games.

Hence, learning being adapt with gamification method which contained game elements and game design methods. An author he stated that there is potential cognitive be benefits of game play from game to gamification. Gamification is used to rise the engagement of users by using game-like techniques [27] also will motivate and encourage perseverance with more creative way. Game elements such as points, rewards and goal settings may as well work as entertainment which will contribute of enjoyment in learning and engage more

learners to actively participating with [5].

Gamification is an adaption from main concept of game, gamification method was used, which contained game elements and game design methods. In other words, the concept is relying on combining the application of game elements in non-context game. This method may assist of improving learning engagement, together enhancing their understanding of learning which suit various learners' learning style and provide more adaptive learning. The strategy to enhance understanding is by empower first of their engagement.

Gamification has been regarded as one of the important ideas on the educational prospect. Since few years, gamification has also give significant impact in a wide range of educational institutions [7-8]. Gamification also widely in health and wellness, online communities and social networks, engineering and marketing [8]. According to Khaleel [7], gamification is an approach that uses game elements to solve a given problem within an enjoyable learning environment. Silpasuwanchai [9], had mentioned that gamification for learning is a multi-disciplinary research area with increasing popularity in the recent three years, attracting the interest of the Education, Human Computer Interaction (HCI), and Game Design communities.

B. Game Genre

Game genre is a term that descriptive narrative content of the game which effects the structure of the story, the depth of character, and other storytelling elements [26]. Originally, genre is found in a film, but interactivity makes game developed with genre. Back then, each game is belonged to one game genre. But nowadays, games were developed with versatility of genre. According to *GameSpot*, [32] more than 60 game genres are available. While, according to Wikipedia, there are 7 main genres where rest of genre are under name of sub-genre. The most-common game genre nowadays that found from top game picked from few game platforms are Action, Adventure, Multiplayer, Role-Playing, Puzzle, Simulation, Platform and Strategy.

C. Game Elements

Game Elements is element that being used to apply gamification in a non-context game. Gamification was applied most frequently in online learning environments (61.11%), classrooms (16.67%), desktop apps (13.89%), and mobile apps (8.34%), with computer science (58.33%) being the most commonly gamified subject [9]. Studies have shown that applying gamification elements in websites engages users. While based on a research, Gressick [4] found that innovation of gamification learning was valued and encourage learning. They also mentioned that gamification elements promoted student learning and enhanced the classroom climate.

3. METHODOLOGY

Data from the study was obtained using two separate method which from literature study on game elements and game elements from real top games. *Literature Study on Game Elements;* [30] Findings of game elements then are used as the instruments in a survey conducted to identify the most engaging game elements to 50 respondents.

Second, *Game Element from top games;* Each game from 3 different platforms are picked which are mobile (iOs, Android and Windows), video and online. Each game selected then are categorized by their game genre. This method is to identify game genre of top games from various platforms. Game picked then being used as instruments in a survey conducted to 56 respondents. Then, game from survey's finding will be categorized according their game genre. This method is to identify game genre of top games through survey conducted.

4. RESULT AND DISCUSSION

A. Identify game elements using survey

Game elements obtained from systematic literature review is then being analysed manually using table matric and through a survey conducted to 56 respondents of Degree Students. Result of both study then will define the most used in past studies and preferred game elements choose by respondents which acquire students' motivation through game elements. Below in table 1 is the summary of game elements mentions by authors and game elements preferred which selected by respondents in a survey conducted. Game elements then are shortlisted based on the median of each results. As conclusion through this process, from all game elements listed, 6 and 7 game elements are selected respectively below. These game elements are virtual goods, mission, levels, progression, leader board, rewards and point.

Table 1 shows game elements mentions by authors

Game Elements	SLR		Survey	
	Total	≥ μ	Total	≥ μ
Collaboration	6		35	
Avatar	8		35	
Narrative Context	5		37	
Virtual Goods	2		40	√
Feedback/Notification	7		36	
Mission	14	√	42	√
Levels	14	√	41	√
Progression	7		40	√
Leaderboard	16	√	40	√
Badges	15	√	34	
Rewards	15	√	41	√
Point	18	√	40	√
∑	127	6	461	7

B. Identify game elements from top games

Game Elements is defined by consideration of choosing games from 3 platforms of mobile (iOS, Android, Windows), video and online. In total of 50 games, 10 games from all platforms will be listed and sorted according its game genre and elements.

i- Identify game genre using table matric

Table 2 shows top games according game genre

Platform		Game Genre: 1- Action 2-Adventure 3-Role Playing 4-Simulation 5-Platform 6-Strategy 7-Puzzle						
		1	**2**	**3**	**4**	**5**	**6**	**7**
Mobil	iOS	1	-	1	1	-	1	6
	Android	1	-	-	2	-	2	6
	Windows	-	-	-	3	-	4	4
Online		3	3	1	1	1	-	-
Video		5	1	-	-	3	1	-
∑		10	4	2	7	4	8	15

Game genre from all these games are Action, Adventure, Role-Playing, Simulation, Platform, Strategy. All games are selected according to two conditions of the most grossing games and the highest profit of year from 2014-2018. Results of game genre from the top games is as in table 2 above. Based on the result, Puzzle score the highest, with the total of 15 games.

ii- Identify game genre using survey

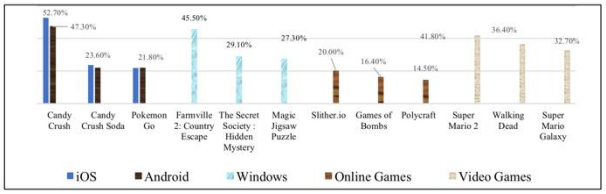

Figure 4 shows top 3 games picked from all platform

All 50 games selected are then shortlisted using a survey conducted to 56 respondents from UTeM Degree Students. From the result obtained, only 3 games with highest score from all category are picked. Results of the survey as in figure 4 above, which most genre resulted from survey is also Puzzle.

iii- Identify game elements from game genre

As both method resulted Puzzle as the highest score. Then all games with will be selected to identified its game elements. Summary of game elements is as in table 3 below.

Table 3 shows game elements from puzzle game genre

Game Elements	∑	≥ μ
Points	9	√
Rewards	9	√
Badges	2	
Leader board	8	√
Progression	9	√
Levels	9	√
Mission	9	√
Feedback / Notification	6	
Event	6	
Good	8	√
Narrative Context	7	√
Avatar	1	
	μ= 6.92	∑= 8

iv- Identify game elements may be used to enhance learning engagement

According to all results, only few game elements will be used for enhancing learning engagement. Game elements are selected from results obtained in table 1 and 3 to table matric as in table 4 below. From the result below, the selected game elements are Mission, Levels, Points, Rewards and Leaderboard.

Table 4 shows game elements from puzzle game genre

Game Elements	**SLR**	**Survey SLR**	**Top Game**	**Selected Game Elements**
Mission	√	√	√	√
Levels	√	√	√	√
Rewards	√	√	√	√
Goods	-	√	√	
Progression	-	√	√	
Leaderboard	√	√	√	√
Point	√	√	√	√
Badges	√	-	-	
Narrative Context	-	-	√	

5. CONCLUSION

In conclusion, gamification is the use of game design elements to motivate user behavior in non-context and enhanced learning climate not imply of creating a game. Gamification basically are implement for learners find learning in fun and interesting way to learn and more engaging them.

This study found that, gamified learning can be implemented using genres Puzzle. Importantly, to be highlight that for making gamification truly impact learners in positive ways, the implementation of game element must be highlight on game elements point, mission and rewards. Overall, respondents are positive on implementing gamification in learning. However, making gamification to work practically speaking in an online platform may appear to be challenging, yet understudies are more agreeable and more rousing other than enabling them to take after the entire course at last

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Soccer Code: A Mobile Learning Games to Introduce Computational Thinking Skill Concept

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Keywords: Computational, Computer Science, Mobile learning games technology, Computer Science subject for upper

ABSTRACT – Advancement in digital technology innovations and excellence is key to the success of Malaysian developing economy. One of the courses that are relevant to digital technology advancement is computer science as it promotes computational thinking (CT) among students. However, the existing method of teaching computational skills using printed modules have not been successful and a new approach is necessary. With widespread usage of smartphones among teenagers and thus pervasive mobile access to the internet; the use of mobile apps becomes feasible. Thus a mobile game based apps is expected to promote CT skills as students have the opportunity to experiment and get feedback anytime and anywhere. Therefore, the aim of this study is to develop a mobile for enhancing CT skills among secondary students undertake computer science subject in secondary schools. The usability evaluation based on Nielsen model had been conducted among 30 respondents (Form 4 students) at Sekolah Menengah Kebangsaan Tinggi Batu Pahat. The result shows that more than 90% of the respondents agreed that 5 of 7 usability attributes had been fulfilled. This findings indicate that the mobile games can be suggested to be used in order to introduce CT skill among student.

1. INTRODUCTION

A key factor in increasing productivity and maintaining competitiveness of a nation is technology capacity and excellence which can be achieved through advancement in science and technology development. According to the Malaysia Economic Report 2016/2017 by the Ministry of Finance (2016), the advancement in information and communication technology (ICT) along with the availability of a wide range of digital devices have allowed for greater participation in the economy. Until March 2017, there were 3.74 billion internet users globally with the growth rate 936% [1]. Malaysia Economic Report 2016/2017 [2] reported that there were 21 million internet users in Malaysia reaching 68.1% of the population [3].

In order to increase education quality in secondary school had been introduced to replace Information & Communication Technology (ICT) subject in Integrated Curriculum for Secondary School (ICCS). Computer Science subject is continuity of Basic Computer Science subject in lower secondary school [4]. Computer Science subject focusing on computational thinking while ICT subject only focused on computing. The subject replacement is targeted to produce individuals who can contributes to digital technology advancement and as new technology innovators for solving current and future problems [4–6].

However, Malaysia will face a serious shortage of human capital in science fields as the target for students enrolling in the science stream is not being met annually at the school and tertiary levels. Decreasing trend in students who are interested to take Science and Technology courses need to be addressed [8,9]. The percentage of secondary school students who are qualified for the science stream only hovered around 30 per cent over the past 10 years, based on their results of the Lower Secondary Examination (PMR), though Malaysia has been aiming for a 60:40 ratio of science/ technical/vocational and arts students since 1970 [10].

According to the Science Outlook Report (Academy of Sciences Malaysia, 2015), despite substantial investment in Science, Technology, Engineering and Mathematics (STEM) education, interest among students is dropping. For Malaysia to stand a chance of producing well-known individuals in this field that could play an active role in human development, today's efforts in gaining the youths' interest in STEM field need to be strengthened [12]. Aligned with that aim, Malaysia has piloted the Computational Thinking and Computer Science curriculum in their education system [6, 13]. Training the younger generation with Computational Thinking and coding languages is seen as an essential foundation in preparing for future digital economy jobs [13]. Ninety percent of future jobs opportunities will be created through digital innovations and will require digital

competencies [14]. To put the relevance of digital technology influence into perspective, its contribution to the national Gross Domestic Product by the year 2020 is expected be 18.2% [14–17].

On the other hand, in an era where science and technology play an essential role in our lives and our nation's economy towards achieving the digital revolution, Malaysian youth's interest in these fields are declining [9]. Progressively, more students are opted out of pursuing STEM fields at the secondary and tertiary levels [8, 11]. One of the reasons students avoid taking STEM courses is because they experience difficulty in grasping STEM basic concepts [8]. One of the key skills to be developed via a computer science course is computational skills and students' competence in this area is crucial in ensuring that they continue to pursue STEM courses. However, current researches shows the urge to improve computational thinking skills through pedagogical strategies, supported tools and also student readiness [19, 20]. Therefore, new approach in teaching and learning at this secondary level to develop students' computational skills which will lead to greater interest in STEM courses and enrolment in the future.

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2. METHODOLOGY

The methodology of this project is ADDIE (Analysis, Design, Develop, Implement and Evaluate) model. Figure 1 shows an ADDIE model methodology.

Figure 1: ADDIE Model Flow Diagram

Analysis; In this phase, we had done some observation in order to gain some information about the problem that faced by the target user. The target user is the one who will use our mobile learning game. In this study, the target user were the students that undertake computer science subject in secondary school.

Design; The second step in ADDIE methodology is design. This phase will give the first look on the actual look of the mobile learning games that developed. The elements such as graphical user interface (GUI), storyboard, structure, types of software, media and references are needed throughout the development of this mobile learning games. These elements are important to decide on how the design and content will be implemented in the next phase.

Development; In this phase, all the elements that had been discussed were developed. The software that had been used to develop the Soccer Code mobile learning game is Adobe Illustrator and Adobe Animate. The main reason of this phase is to ensure that the mobile learning game will fulfil the requirement and pass the standard that had been set. The editing software for this Soccer Code is Adobe Illustrator CC and Adobe Photoshop CC while the authoring software that been used is Adobe Animate CC. Figure 2 shows a development screenshot by using Adobe Animate CC.

Figure 2: Soccer Code in Adobe Animate CC

Implementation; After development phase is done, we proceed to the next phase which is implementation phase. In this phase is to find the imperfections, lacking in the Soccer Code. Firstly, user can choose either boy or girl to be a narrator in the Soccer Code and show the stages that consists of Decomposition, Pattern Recognition, Abstraction and Algorithm. Each of the stages has different objective to win of each level and also provides one tutorial level and five level. Figure 3 shows a Soccer Code than can be played by using Android device.

Figure 3: Soccer Code

Evaluation; After completing all the phase, the last phase is evaluation phase. In this phase, this mobile learning game was evaluated to find features that can be improved. This study performed the usability testing based on Nielsen Usability Model. Figure 4 shows a Nielsen Usability Model.

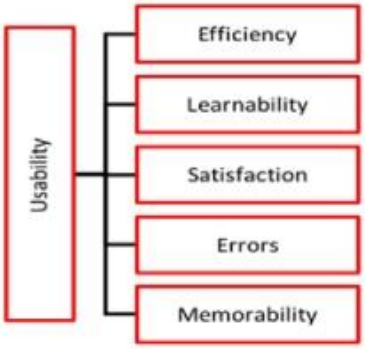

Figure 4: Nielsen Usability Model

3. RESULT AND DISCUSSION

Table 1 shows the result that analysed from respondents based on 7 Nielsen attributes. The visibility attribute score the highest percentage (98%) while aesthetic and minimalist design score obtain the lowest score (65%). This attribute can be improved in order to fulfil the good usability. There are 5 attributes that score more than 90%.

Table 1: Result from respondent

Result / Attribute	Yes	No
Visibility	98%	2%
Match between Application and the Real World	93%	7%
User control and Freedom	92%	8%
Consistency and Standards	75%	25%
Recognition rather than recall	97%	3%
Aesthetic and Minimalist Design	65%	35%
Help and Documentation	92%	8%

Table 2 shows a list of questions that require respondents to answer. Each of the question based on the attribute in the Nielsen Usability Model. For example, first two question is about visibility attribute and it also same with other questions.

Table 2: Question in the questionnaire

No	Content
1	Clear animation description.
2	The information deliver effectively.
3.	The theme used is suitable with application development.
4.	The way for each module been delivered is corresponds to the real world.
5.	The reset button is useful when error occurred.
6.	The user knows clearly the exit button.
7.	Consistent icon button.
8.	The level had been arrange in order.
9.	Easy to understand the tutorial.
10.	Be able to identify the function of the given button.
11.	Suitable home page sketches.
12.	Appropriate button size.
13.	Information about computational thinking is easy to understand.
14.	Additional information presented is relevant.

4. ACKNOWLEDGEMENT

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Kiddo Disleksia Mobile Application: A Dyslexia Screen Tool in Malay Language

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Keywords: Dyslexia, Kiddo Disleksia, Screen Tool, Malay Language.

ABSTRACT – Identification of potential dyslexic among Malaysia student is crucial to ensure earlier intervention is given. Current practice in the Malaysian school system, screening test has been given based on teacher's observation and intervention. The low number of student enrol in special education indicate this task is difficult. It is due to untrained and lack of awareness regarding dyslexia among Malaysia teacher. Therefore, the easy, simple and accurate screen test tool are required. Kiddo Disleksia, a dyslexia screening tool based on mobile application has been designed and developed. The application exploits the uses of text, video, audio and graphic in multimedia to screen student with dyslexia based on visual and auditory. Kiddo Disleksia is developed by using Malay language as it's specifically develops for student in earlier learning to recognize and distinguish the alphabet. Besides, this application able to use as learning tool for dyslexia student to identify alphabet letter and phonic (alphabet sound). The mobile gamed based approach is used to screen the student with fun and innovative way. A usability study has been conducted towards 20 dyslexia students and result shows 85% of respondent feel the application able to help them learn easier. They agree that Kiddo Disleksia able to screen the dyslexia student with fun and easy way.

1. INTRODUCTION

In Malaysia, Ministry of Education recognized dyslexia as a kind of Specific Learning Disabled (SLD) and the students are included in special education program. Current practice in the Malaysian school system, screening test has been given based on teacher's observation and intervention. Identify dyslexia among student is proved difficult task. Enrollment statistic of SLD student at special education school is 53,617 students in 2016 which represent 1.05% of Malaysian student. The enrollment percentage is smaller than expectation since the expert estimate 5%-10% of population having dyslexia [1]

International Dyslexia Association (IDA) define dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. Dyslexia is not disease and it doesn't have the cure. Earlier intervention is crucial to ensure early intervention program and support are given to them. Past researcher [2] indicate the lack of awareness of dyslexia among Malaysia and unexperienced teacher which may lead to misjudge student even before screen test given. Therefore, the easy, simple and accurate screen test tool are required.

Multimedia is proven as effective learning tool to SLD students. ICT technology like touchscreens, accelerometers, gyroscopes, voice recognition, sound reproduction, powerful processing and wide availability of mobile device are among tools that are very useful [3]. The multisensory approach uses visual, auditory and kinesthetic is very helpful in teaching the learning disabled [4]. The same approach is applied to screen dyslexic student with fun and innovative way.

2. METHODOLOGY

At the beginning, it was understandable that for the design of such an mobile application, we needed to use good methodology design for development. Differentiating from the traditional software development methodologies, a combination of Addie Model provide sufficient development methods for software or application development cycle. Figure 1

show Addie model for software development

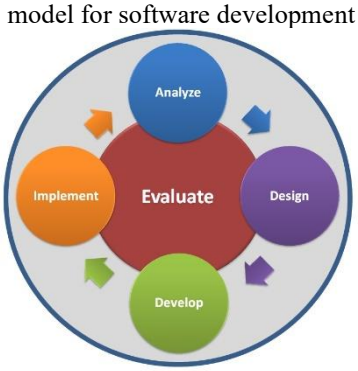

Figure 1: Addie Model

Based on recurring analysis, design, and evaluation cycles, rather than a linear design processes, we gathered the results which occurred from the final evaluation and we were able to improve various elements of the application during its stages of development

3. RESULT AND DISCUSSION

Kiddo Disleksia is a mobile application build as dyslexia screening tool. This application is focusing on earlier learning student as they in process to learn recognize and distinguish the alphabet. Instruction in this application is written in Malay to ensure the students able to understand and react as per instruction. Kiddo Disleksia is suitable for student between age 5-10 years old. The application has following objectives i) to assist alphabet identification and phonic ii) to motivate dyslexic student to learn and read and iii) to screen dyslexic student in easy and fun way.

Letter identification is the first step for dyslexic student before they begin to read and write. The skill requires the children to recognize, memorize and repeat the process again, again and again. Kiddo Disleksia employs multimedia element such text, graphic audio and animation in letter identification and phonic blended with multisensory approach. Gamification Based Learning is used as approach to ensure student able to play without any feel being screening. The students require to play alphabet games to distinguish the alphabet based on screen. With game based approach, student more concentrate and less pressure during the screen test.

Figure 2: Kiddo Disleksia Interface Design

A usability study has been conducted towards 20 dyslexia students at Special Education School Batu Pahat. 85% of respondents feel Kiddo Didleksia able to help them learn easier. They also comment that they feel enjoy play game rather than been screening. Respondents also agree that the application able to give awareness to public about dyslexia.

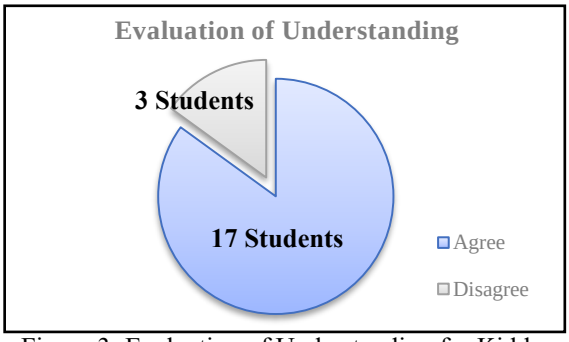

Figure 3: Evaluation of Understanding for Kiddo Disleksia Application

The students with different levels of dyslexia indicated differences in the duration of each test, while the students with mild symptoms of dyslexia completed the tests much faster than the others. Also, the students with mild dyslexia demonstrated higher reading recognition and comprehension compared to the students who showed severe dyslexia symptoms. Those groups of students didn't differ significantly in spelling or listening.

Kiddo Disleksia able to commercialize as teaching tool, earlier learning tool and screen test tool to dyslexic student. It has potential for further research in the teaching and learning for dyslexic student. The innovative features of this application are:

a) Identification of alphabet and phonic.
b) Learning can be at anywhere and anytime.
c) Learning process more enjoyable and interactive.
d) Screen test are able to done at anywhere and anytime.
e) Screen test in fun and enjoyable mode.
f) App able to use to motivate and draw student attention.

4. CONCLUSION

Given the possible benefits of a smartphone or mobile application for children with different learning requirements, we dedicated on designing a mobile application which is focused at improving children's fundamental learning skills through the use of unconventional technology advancement (m-learning). We focused on developing a mobile application which could potentially substitute learning and hopefully helping a children with their learning problems by cultivating some of their elementary skills, such as language abilities.

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Printed Materials Using Augmented Reality for Places of Attraction

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Keywords: Augmented reality, Augmented reality book, Situated Learning Theory

ABSTRACT – Augmented reality (AR) technology allows for creative linkages between the physical and digital worlds. Multisensory, visual and auditory experiences can be added to the printed materials that are potential to enhance tourists' experiences in knowing places of attraction. However, effective usage of AR in tourism is still limited. This paper was to explore printed materials by integrating the AR technology in story books and tourism pamphlet to assist users in accessing valuable information regarding places of attraction in Kuala Lumpur. Situated learning theory has been integrated as a model of instruction in designing the prototype for these printed materials.

1. INTRODUCTION

Augmented reality (AR) technology has become one of the technological advances that enable the users to enrich their experiences. In tourism industry, AR might yet to be used as a new way of advertisement in any written materials like books, catalogues, brochures, pamphlets and flyers. This implies that AR technology might offer a much better understanding of what the users desire to spend, utilize or leisure with. In Korea [1], AR has been used as a tool in the tourism industry. Ability of AR to enhance tourist experience by projecting digital content into user's real environment have significantly improved [2]. Besides, AR has become one of useful tools that can increase the interest to visit actual destination which enrich tourists experiences [3]. AR is able to promote places of interest while enriching tourists' experience to visit place of attraction [4]. To help convey information about places of attraction in Kuala Lumpur, a prototype of AR-based mobile application had been developed.

2. RELATED WORKS

AR Technology

AR combines real and virtual objects, interactive in real-time, and is registered in three dimensions. Figure 1 shows Milgram reality-virtuality continuum.

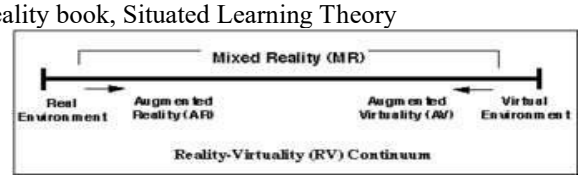

Figure 1: Milgram reality-virtuality continuum

AR for tourism guide

For the tourism industry, there are few applications that have been incorporated with AR. A prototype of mobile Sarawak tourism system has incorpoated AR and multimedia object for their image library [7]. Moreover, in [8], they have developed "Exploresia" to visualise Indonesia by using AR technology which allows tourists to select any point of interest in Indonesia on the printed map.

Printed products using AR

The traditional way for tourists to help them navigate the a city is by using pamphlet of city map or travel guide books. With the help of AR, tourists that use their smartphone and tablet computers are able to point their built-in cameras on any object they want in order to generate simulations of real environment of their place of attraction. AR has also been used widely in children education by integrating printed card with marker application to be used with AR technology using tablet or mobile phone [5]. This shows that children are provided with a better interactive experience when playing and learning [6].

Situated Learning Theory

Situated learning, suggests that learning takes place through the relationships between people and their prior knowledge with authentic, informal, and often unintended contextual learning. Major elements in situated learning are content (facts and processes of a task), context (situations, values, environmental cues), and community (the group where the learner will create and negotiate).

3. METHODOLOGY

Prototype Design

In this study, the printed materials for places of attraction using AR book and AR pamphlet were enhanced. Situated learning theory has been integrated as a model of instruction in designing the prototype for these printed materials. Therefore, various multimedia

elements like video, graphics, text and 3D objects were integrated into this prototype to achieve the intended purpose. This prototype was using marker-based AR where the digital world was anchored to the real world. To display any virtual object (animation or video or 3D image) right onto the pamphlet or page of a book, the user is pointing the camera at that particular page which consist of a distinctive picture as a marker on the page. This distinctive picture will be recognized and the virtual object is tracked to the appropriate place on the page. Table 1 shows design application based on the situated learning theory

Table 1: Design Application Based on Situated Learning

Elements	Characteristics	Design Applications
Content	Authentic facts, authentic activities	Latest information, interactive slide
Context	Authentic situations	Video 360 panorama
Community	Collaborate	Discussion

The main hardware used were: display device (handphone or tablet), tracking device, input device (camera or keyboard). Software used : 3D Studio Max, Adobe Photoshop, SoundForge, Unifi 3D.

4. RESULTS AND DISCUSSION

Content: The prototype provides authentic facts. In this prototype, information on each bird in Taman Burung is using real image and information as shown in Figure 2.

Figure 2: Authentic Facts on Birds at Taman Burung

Context: To apply authentic, situations this prototype provides 3D panorama on Aquaria and real video to display fishes in the pond.

Figure 3: Authentic Environment

Community

While using the application, users can interact with each other and share the knowledge .

A pilot study has been conducted to evaluate the reliability of the usability questionnaire of the prototype. Results in Table 2 show that the items in the questionnaire are reliable to evaluate the usability as the value is above 0.70.

Table 2: Reliability of Usability Constructs

Constructs	No of Items	Alpha Cronbach
Ease of Use (SE)	4	0.72
Usefulness (SU)	3	0.75
Information Quality (IQ)	5	0.89
Interface (UI)	4	0.76

5. CONCLUSION

This study presents findings on the implementation of situated learning theory as a model of instruction in designing the prototype of AR printed materials such as story books and visitor guide to help local and international tourists to navigate the place of attraction. Results on the pilot study show that the items in the questionnaire are reliable to evaluate the usability of the prototype.

6. ACKNOWLEDGEMENT

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Applying Gagne Nine Event of Instruction and Design Thinking Approach in MOOC

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Keywords: MOOC, design thinking, Gagne's Nine Events of Instruction

ABSTRACT – This is the first ever massive open online course (MOOC) in Malaysia that applies both Gagne's Nine Events of Instruction and Design Thinking Approach to design engaging and meaningful instruction for online learning. The following nine strategies have been used in designing MOOC. 1. Gain attention of the students 2. Inform students of the objectives- Inform students of the objectives or outcomes to help them understand what they learn. 3. Stimulate recall of prior learning - Help students make sense of new information by relating it to something they already know or something they have already experienced. 4. Present the content - Present course contents and introduce 5 stages of design thinking approach: Empathise, Design, Ideate, Prototype and Test to learners. 5. Provide learning guidance - mind mapping diagram. 6. Elicit performance (practice) - allows students collaborate with their peers in completing class assignment.7. Provide feedback - Provide immediate feedback of students' performance to assess strength and weakness of learning. 8. Assess performance- Use a pre-test for endpoint knowledge or skills. Conduct a post-test to check for mastery of content or skills. 9. Enhance retention and transfer to the job- To help online learners to develop expertise and internalize new knowledge.

1. INTRODUCTION

The authors offer the first ever massive open online course (MOOC) in Malaysia that applies both Gagne's Nine Events of Instruction and Design Thinking Approach to design engaging and meaningful instruction for online learning. The authors use MOOC to conduct approaching training on strategic knowledge management, which will enable more attention to be paid to promote student-centred learning and increase in students' academic performance through interaction on social networks and online chat room. In supplement to online learning through MOOC, the authors will have a face-to-face discussion with learners in traditional classroom in Multimedia University to assess their learning performance so that effective learning measure can be taken to enhance their learning of this course.

2. COURSE DELIVERY METHOD

This MOOC course is guided by Gagne's theory of instruction. This MOOC course allows learners to learn according to their personal capabilities, and personal goals. One of the most important considerations while using Gagne's model of instruction is to identify the learning outcomes to be achieved.

Gagne's nine events of instruction applied by this online course are as follows:

1. Gaining attention
2. Informing participants of objectives
3. Stimulating recall of prior learning
4. Presenting the content
5. Providing learning guidance
6. Eliciting performance
7. Providing feedback
8. Assessing performance
9. Enhancing retention and transfer

3. GAINING ATTENTION

The first learning event of this strategic knowledge management MOOC course is gaining attention, Attention is defined by Slavin [1] as "active focus on certain stimuli to the exclusion of others." Learner's attention in the online teaching and learning environment is essential for effective learning, yet it is a limited resource. This MOOC course gains online learners' attention through little surprise before the start of each module. This MOOC course also gain students attention through the usage of cues that indicate "this is an important concept" by raising voice to signal that critical course content is about to be imparted in a particular online module, with the application of gestures in introducing lesson to engage students' curiosity.

4. INFORM STUDENTS OF THE OBJECTIVES

After the introduction, MOOC learners are apprised of the learning objectives to aid their learning process. These objectives intend to explain skills and proficiencies the learners will hopefully be able to achieve after each MOOC module. Participants are given ample opportunities to ask questions with relation to the learning objectives to help them understand what they are learning and why they need to learn.

5. STIMULATE RECALL OF PRIOR LEARNING

Slavin [1] describes that the success of new learning will depend on whether the student can remember and assimilate new MOOC module with the necessary prior

learning. As suggested by Gagne et al [2], previously acquired knowledge must be accessible during the process the current learning event. This MOOC course facilitates learning process by allowing learners to integrate new learning module into their previous working and life experience, Learners will be encouraged to share their prior experience related to topic such as knowledge capture, which will allow all members to benefit from the experiences of others.

6. PRESENTING THE CONTENT

A detailed explanatory presentation about strategic knowledge management is used to present the content to the MOOC learners. Topics covered in this presentation include a comprehensive explanation to each topic covered in the module. Basic elements of design thinking and 5 stages of design thinking approach: Empathise, Design, Ideate, Prototype and Test are presented to learners through cue lesson content to ensure effective understanding of the concept. Face-to-face tutorials are provided in traditional classroom to ensure that the learners can fully understand the concept of strategic knowledge management and design thinking.

7. PROVIDING LEARNING GUIDANCE

Nyaga, Oundo and Kamoyo [4] argue that adequate learning guidance contribute to better growth of students' academic competence. Tuckman and Monetti [3] also advise that instructors to plan the technique they will use to guide the learners in a given task and how they will present these techniques. A summary mind mapping diagram is provided at the end of each MOOC module to stimulate effective visual learning and understanding of the taught concept. Online supplement resources are also provided to allow students to have a better learning experience.

8. ELICITING PERFORMANCE

MOOC learners are asked to carry out an assignment that carries 30 percent of the coursework marks. MOOC learners are allowed to complete the following tasks in a small group of not more than 5 members:

1.Empathize (20%) - Interview 5 small and medium enterprise (SME) operators to have a deep understanding about the knowledge management challenge.

2.Define (20%) - Create a point of views which is based on SME operators' insight. Clearly articulate the knowledge management challenge that the learners want to solve.

3.Ideate (20%) - Brainstorm and come out with as many solutions as possible.

4.Prototype (20%) - Build a representation of ideas to show to others.

5.Test (20%) - Share prototyped idea with SME operators for feedback.

6.Reframe and Role Play (20%) - Reframe prototyped idea based on feedback, role play the idea in traditional classroom.

This assignment follows the five standard procedure model of design thinking. During the first stage, SME operators are interviewed and their own knowledge management experiences and challenges are gained. The objective is to build an understanding of the SME operators and their problems. In the second stage, define stage, the knowledge management insights that were gained in the empathize phase are summarized into a short concrete sentence in order to formulate a relevant challenge on this basis. The objective is to develop a more definite understanding of knowledge management challenge faced by SMEs. In the third phase of the assignment, the ideate stage, ideas are gained for the formulated knowledge management challenge. The objective is to derive many different Ideas for the prototype. At the Prototype stage, MOOC learners are asked to create a simple prototype that makes it possible to turn ideas into tangible solutions to solve the knowledge management challenges of SMEs in Malaysia. Prototypes are tested by SME during the Test stage when the SME team can try the proposed solution out and provide suggestion for further improvements. This Test stage takes place in the context of the SMEs users. The tests also provide an opportunity for MOOC learners to gain feedback from SMEs to enhance the solution if necessary.

9. PROVIDING FEEDBACK

Face-to-face feedback at traditional classroom is important because it allows participants to raise problems that they face while completing their strategic knowledge management assignment using design thinking process. Face-to-face feedback is important as it affords MOOC learners to be aware of their strengths and weaknesses immediately after each of the empathize, define, ideate, prototype and test stages of their assignment so that appropriate action can be taken after each design thinking to improve their performance. Immediate feedback after each design thinking stage is central to developing learner's confidence and competence. While MOOC learners are working on their assignments, they are provided with immediate feedback to clarify any uncertainties that may arise.

The "Ask–Tell–Ask" feedback model is used to foster learners' abilities to identify their own strengths and weaknesses. In the beginning of the feedback session, learners are asked to elaborate their experience in doing this assignment and the key insights that they gain from this assignment. Using positive and constructive method, instructor provides feedback so that learners will be more clear about their own strength and weakness. After that, learners are allowed to ask the instructor if they are unclear about the feedback. Learners could then reflect on the feedback provided and compare them to their own self-evaluation to identify points to improve.

10. ASSESSING PERFORMANCE

Evaluation is an act of paramount importance in the teaching-learning transaction. In face-to-face classroom meeting, the instructor uses a pre-test to test learners for endpoint knowledge or skills that they acquire from MOOC prior to the face-to-face meeting. Based on the result of the pre-test, learner's weak area will be identified and detailed explanation will be provided to

improve their understanding.

Before the end of every face-to-face class, the instructor will conduct a post-test to check for Learner's mastery of content or skills. Final examination is used to grade the learner's overall understanding of the course at the end of the 13 week course in the examination hall of the university.

Pedagogical approaches that involve problem-based learning, project-based learning, and inquiry-based learning are used to enhance students' design thinking skills within a mixture of MOOC learning and classroom feedback and examination. Such learner-centered approaches can help to raise learners' awareness about good design thinking processes and enhance their interest in solving complex problems through collaboration with other learners under the guidance of the instructor. Associated reframe and role playing activities are carried out in a way that requires learners to generate ideas/solutions, design prototype, receive feedback about the feasibility of the prototype through demonstration and role playing. Under the guidance of the instructor,

11. ENHANCING RETENTION AND TRANSFER

At this final stage of Gagne's nine instructional events, guide and briefing are provided to enhance the learner's ability to recall the knowledge or skills and apply what has been learned in this Strategic Knowledge Management course to other related courses such as Knowledge Auditing and Mapping. Guide and briefing is provided so that learners can easily transfer the common concepts or basic knowledge that they have learned in this course to a new related course given the fact that new course is easier to learn when existing course that has already been learned has much in common with the new course.

12. CONCLUSION

This is the first ever massive open online course (MOOC) in Malaysia that applies both Gagne's Nine Events of Instruction and Design Thinking Approach to design engaging and meaningful instruction for online learning.

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Improving Students' Motivation Using a Conversational Robot in Tamadun Islam dan Tamadun Asia (TITAS) Course

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ABSTRACT – This project aims to enhance learning in Tamadun Islam dan Tamadun Asia (TITAS) course among students. Therefore, to reach the aim, three research questions were constructed; RQ1) What are the traditional ways of students in learning TITAS course? and RQ2) How can e-learning enhance student learning in TITAS course? In addition, there are three research objectives in order to answer the research questions; RO1) To find the traditional ways of students learn for TITAS course; RO2) To design and develop the e-learning based on three subtopics in TITAS course; RO3) To evaluate the e-learning among students who have learned TITAS course. Besides that, the methodology for this project will be based on Generative Research Method. Next, the analysis part of data collection for this project will be analysed using Affinity Analysis. After that, an e-learning website was developed using WordPress. Then, a conversational QnABot was designed using a cloud-based Amazon Lex intelligent services. Finally, a usability test was conducted to evaluate feedback from respondents.

1. INTRODUCTION

E-learning is the current trend that most of educators implement in teaching their students. Moreover, e-learning can be in many platforms such as mobile learning application and web-based learning. In addition, e-learning provides an alternative to traditional classroom education and enables students to access course information without time restrictions or geographical constraints [1]. Therefore, the purpose of this project is to develop web-based learning for TITAS course.

Most of students learn this course using the traditional ways, such as slides and books. Moreover, students complained that this course is quite boring since it related with historical and they need to do a lot of reading in order to understand it. Furthermore, educators are always facing matters with motivation and variations in the classroom [2].

2. METHODOLOGY

The method that will be used for this project is Generative Research Method. In order to collect the data needed for designing this e-learning, an interview with five participants who have learned TITAS course will be conducted. In the interview sessions, they need to answer eight questions for each of the participants to answer during the interview. The questions are listed as below:

1. How did your lecturer teach this course?
2. Do you understand the explanation that deliver by your lecturer?
3. Do you understand the content that your lecturer used in teaching this course?
4. What will you do if there is any topic that you do not understand?
5. Where do you find extra resources for this course?
6. Have you ever tried using any/other e-learning related with this course?
7. Are/is the e-learning really help you in understand this course?
8. How about the arrangement of content in the e-learning?

Next, the data gathered based on the interview will be analysed using Affinity Analysis. After done with analysing the data, the e-learning will be developed in website platform using WordPress. Lastly, after the e-learning has been developed, it will be tested by the five participants who have been interviewed before.

3. AFFINITY ANALYSIS

In order to collect the data needed for designing this e-learning, an interview with five participants who have learned TITAS course will be conducted. In the interview sessions, each of the participants need to answer eight questions. Next, the data gathered based on the interview will be analysed using Affinity Analysis. There are two part in Affinity Analysis; the first part is to quote the answers from the interviewees in sticky notes and the second part is to group the stick notes into different themes. Figure 1 shows the diagram for the Affinity Analysis result.

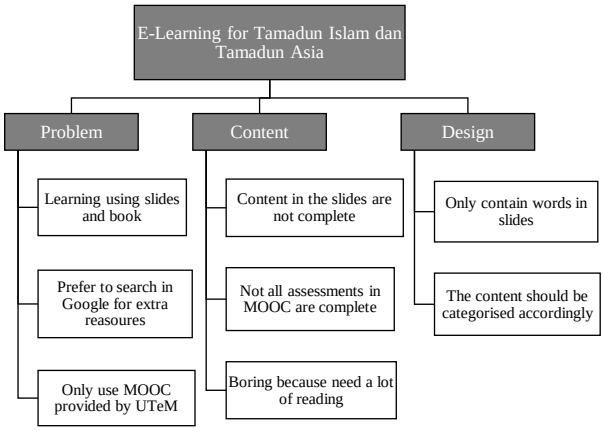

Figure 1: Affinity Analysis result

4. RESULT AND DISCUSSION

A usability testing is conducted in order to evaluate the e-learning among students who have learned TITAS course. Therefore, the test plan for this project is develop in order to plan out the activity to conduct the usability testing. Table 1 explains the detail of the usability test plan.

Table 1: The test plan for the study.

Product Under Test: Improving Students' Motivation Using a Conversational Robot in Tamadun Islam dan Tamadun Asia (TITAS) Course				
Objective: To evaluate the e-learning among students who have learned TITAS course.	**Participants:** 5 students who have learned TITAS course.	**Location and Dates:** FTMK, UTeM	**Test Task & Duration:** Duration 20 minutes per participant. 1. Use the E-learning. 2. Answer the questionnaire given.	**Responsibilities:** 1. Explain the objective of the usability testing to the participants. 2. Assist the testing session if the participant needed help. 3. Observe and collect the data.
Procedure: 5 minutes Welcome and briefing to the participants → 10 minutes Carry out testing → 5 minutes Answering questionnaire				

In the data collection for the usability testing, we asked the participants to answer a Likert scale questionnaire that consists of six questions that were designed to find out students feedback on the new learning design that incorporates a conversational robot (QnABot) developed using a cloud based Amazon QnABot. The Likert scale is ranged from 1 (strongly disagree) to 5 (strongly agree). The list of questions in the questionnaire are listed as follows:

1. I found that this e-learning is very helpful.
2. I found that study using e-learning is more effective rather than using slides and book.
3. QnABot embedded in this e-learning is very helpful in order to get answer immediately regarding the subtopics.
4. I found that the content of e-learning is very attractive and easy to understand.
5. I found that videos in this e-learning is relevant to this course syllabus.
6. I found that content in the e-learning is all covered according to this course syllabus.

As for the result, Figure 2 shows the bar graph and Table 2 shows the mean and standard deviation that represents feedback from 5 respondents who have learned TITAS course.

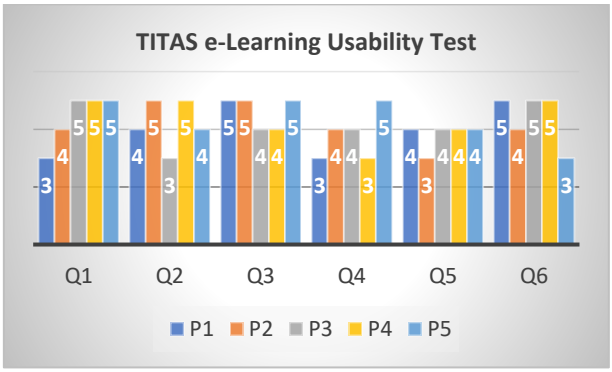

Figure 2: Results of the Usability Test

Table 2: Mean & Standard Deviation for the Usability Test Results

	Q1	Q2	Q3	Q4	Q5	Q6
Mean	4.4	4.2	4.6	3.8	3.8	4.4
Std. Dev.	0.89	0.84	0.55	0.84	0.45	0.89

Therefore, we can conclude that most of the participants found that this project is very helpful in order to assist online learning for the TITAS course. where three participants strongly agree that this e-learning helps them in learn this course better. Therefore, the participants also strongly agree that this e-learning is more effective than slides and book. In fact, they also strongly agree (mean=4.6) that the chatbot that embedded in this e-learning also helps the students to get answers immediately when they ask the questions.

Furthermore, four from five participants strongly agree that the content of e-learning is attractive and easy to understand and the videos in this e-learning is relevant to the syllabus. In addition, they also agree that the content of this e-learning covered all syllabus.

5. CONCLUSION

In conclusion, this project shows the implementation of latest technology which is QnABot for e-learning. Since students are still learning this course in traditional way, thus we proposed this project to enhance students' learning by using the QnABot technology. This e-learning was developed by using WordPress so that QnABot can easily be embedded in it. In addition, this e-learning is focused on three subtopics only that related with this course. Therefore, we hope students can improve their motivation and enhance their learning for this course with the help of this e-learning.

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