Simplification Of Game Development Learning Via Massive Open Online Courses (Mooc): A Preliminary Analysis
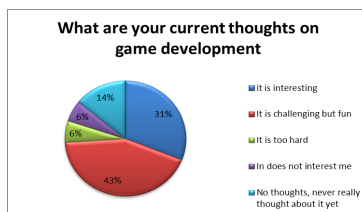
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Graphical abstract

What are your current thoughts on game development

- it is interesting — 31%
- It is challenging but fun — 43%
- It is too hard — 6%
- In does not interest me — 6%
- No thoughts, never really thought about it yet — 14%

Abstract

The complication of game development tools creates barriers of entry for the majority of students to eliminate a potential creative platform. Generally, this leads to students' lack of interest in game development. Creativity among students remains highly untapped without a platform for creative development and engagement. Massive Open Online Course (MOOC) offers a platform to teach a variety of courses without boundaries of time, space, and cost, including game development learning. Therefore, a preliminary analysis is conducted to identify current game development tools that can facilitate in the simplification of game development for students, to understand students' perception on game development and their interest in engagement with it. The analysis is also to determine obstacles and hurdles they face in embracing it, to establish learning possibilities, and solutions that can be incorporated into a university program in hope that these tools can invigorate creative talents of students. This paper presents the review of literature on MOOCs and self-organized learning. The methodology of preliminary analysis is also discussed. Finally, the analysis of results and findings on student's perceptions on applying game-based learning in education and their interest in game development courses, perception of game development-based learning are presented. The game development tool is evaluated to rate its specific features. The findings of preliminary analysis are hope ton help to improve enrolment, the suitability of MOOCs to engage students in creative learning of game development learning.

Keywords: Games development, MOOC

Abstrak

Komplikasi bagi alatan pembangunan permainan mewujudkan halangan bagi kemasukan majoriti pelajar dan menghapuskan platform kreatif yang berpotensi. Seterusnya, ianya akan membawa kepada pengurangan minat pelajar dalam pembangunan permainan. Kreativiti di kalangan pelajar juga masih belum dapat diterokai sepenuhnya tanpa platform untuk pembangunan kreatif dan platform untuk keterlibatan mereka. *Massive Open Online Course (MOOC)* menawarkan platform bagi mengajar pelbagai kursus tanpa sempadan masa, ruang, dan kos, termasuk pembelajaran bagi pembangunan permainan. Oleh itu, analisis awal dijalankan untuk mengenal pasti alat pembangunan permainan semasa yang boleh membantu dalam memudahkan pembangunan permainan untuk pelajar, bagi memahami persepsi pelajar terhadap pembangunan permainan dan minat mereka serta keterlibatan mereka dengannya. Analisis ini juga dilakukan untuk menentukan halangan dan rintangan yang mereka hadapi, untuk mewujudkan kemungkinan pembelajaran, dan penyelesaian yang boleh dimasukkan ke dalam program universiti dengan harapan bahawa kaedah ini boleh menggilap bakat kreatif pelajar. Penyelidikan ini mengemukakan kajian literatur terhadap *MOOC* dan pembelajaran kendiri. Metodologi analisis awal juga dibincangkan. Akhir sekali, analisis keputusan dan penemuan persepsi pelajar mengenai permohonan berasaskan permainan-pembelajaran dalam pendidikan dan minat mereka dalam kursus-kursus pembangunan permainan, persepsi permainan pembelajaran berasaskan pembangunan

dibentangkan. Alat pembangunan permainan ditaksir untuk menilai ciri khusus. Hasil analisis awal adalah diharapkan dapat membantu meningkatkan penyertaan pelajar, kesesuaian bagi *MOOC* untuk melibatkan pelajar dalam pembelajaran kreatif dalam pembelajaran pembangunan permainan.

Kata kunci: Pembangunan permainan, MOOC

1.0 INTRODUCTION

Digital Game-Based Learning (DGBL), is a technology used by educators to support the teaching and learning process to make students enjoy and be more engaged while they are playing games and learning at the same time. Students are motivated to continue the game until they win the game and learn all the contents at the end of the game. The motivation of learning through playing computer games is much higher than any other learning tools as playing is seen as pleasure and not exercise. Many feedback features of game, such as challenges and performance, have found a positive influence of game on learning.

In the United States (US), Entertainment Software Association [1] reported that the video game industry posted strong sales in 2011, generating nearly US$25 billion in revenue. The sales of gaming software and content, including games made for consoles, portable gaming devices and digital full game downloads, counted for approximately US$16.6 billion in total. According to the report from Entertainment Software Association [2], entertainment software is one of the fastest growing industries in the US economy. From 2005 to 2009, the entertainment software industry's annual growth rate has exceeded 10 per cent. In 2009, the entertainment software industry's value added $4.9 billion to the US Gross Domestic Product (GDP). These numbers are enough to convince that there is some real values in gaming as educational vehicles as discussed later.

Additionally, in a study of teachers' attitudes on digital games [3-4], they found that 95 per cent of teachers surveyed reported that they have used digital games that were created specifically for educational use; 32 per cent of teachers used digital games in the classroom 2-4 days per week and 18 per cent used games every day. There are 70 per cent of teachers who agree that using digital games increase lower-performing students' motivation and engagement with the curriculum. Sixty per cent of the teachers said that using digital games helped them to personalize instruction, better assess knowledge, and collect helpful data for lower-performing students. Sixty per cent of teachers said that all of their students have become better collaborators and have increased attention to specific tasks since incorporating digital games into their lesson plans.

Recent trend also indicates that educational games, simulations, serious games, and entertainment digital games all offer great opportunities for appropriate practice and are being discussed in both formal and informal educational circles. Although digital games have been broadly accepted as educational technology for many years, it is only recently that the integration of pedagogy and learning theories in educational games happened and could increase the learning performance and support the subject's syllabus [5]. Furthermore, the trend is also moving towards how educational game has a vital impact on learning process, higher level cognitive development, critical thinking, and strengthening motivation among learners [5-9]. In fact, the attributes and potentials of digital games can create opportunities to increase students' learning either for children or teenagers, especially for dull subjects and teacher-centric method of teaching. Teacher-centric instruction means transmitting knowledge from teacher to student, and student passively receives knowledge. Teacher's role is to be primary information giver or presenter. The usual teaching condition is for a teacher to stand in front of a large teaching space and speak to students. The class is often accompanied by PowerPoint slides that are projected on a screen behind the teacher.

However, the recent trends in game development field can be categorized into three characteristics based on the challenges of learning game development in higher education [10]. First, there is little time for game development. Second, latest techniques such as 3D, network, and multimedia are being applied to the game development. Third, a game engine is utilized to develop a game of high completion in the aspect of stability. Thus, it is inevitable that education time should be constantly increased in order to conduct the game programming education according to the recent game development trends. Moreover, time restriction makes it difficult to teach game programming with the latest technologies such as 3D, network, and multimedia.

Massive Open Online Course (MOOC) is a low cost online course that can be used by anyone with unlimited participants who are registered in open learning website. This learning tool is affordable and cheaper compared to students that have to pay school and course fees to attend the class to learn how to develop a game. Therefore, the researcher did a preliminary analysis survey to determine

students' perception about simplification of game development course and features of game development tool. To solve this problem, the researcher has proposed utilizing MOOC to teach game development course. Some literature on MOOC and self-organized learning are going to be discussed. Results of preliminary analysis and discussion on this will be presented at the end of paper.

2.0 MASSIVE OPEN ONLINE COURSE (MOOC) AND SELF-ORGANIZED LEARNING

There are some gaps between students and game development learning. First, the complexity of game development tools and lifecycles create barriers of entry for students. This will make it hard for students hard to engage themselves in creative learning and inhibits them from exploring creatively in game development. Second, students are generally lacking in interest in computing field. Majority of students perceive the course material is dry and not relevant to the real world applications [11]. Third, a program that focuses on simplification of creative game development and learning is important for students' active participation as teaching method are not attractive to school children and university students [12].

In order for the problems and challenges mentioned above, we need an innovation method to overcome these. Disruptive innovation always produces more simple, affordable and customizable products and services to the users. Disruptive innovation means that it is an innovation that disrupts the improvement trajectory by bringing their products and services to the market and often simpler, cheaper, less important and ease to use become highly valued among users. MOOC is an example of disruptive innovation that can offer variety of online courses to all affordable students.

To solve the problems for this research, the researcher proposes to use MOOC for teaching game development course and hence increasing creative learning via this course. Instructional video which is created by the teachers can be uploaded in MOOC and open for all registered students for learning. There is a consensus on the reasons why universities and learners should engage in MOOC. Learners mostly reported that they were satisfied with learning through MOOC and curiosity about the experiences in using MOOC [13]. The benefits of MOOC to learners are that they can access high quality of materials, contents and new types of collaborative learning experiences in MOOC [13].

MOOC has been created with a clear purpose to provide more learning opportunities and improve learning experience [14-15]. From past studies, MOOC is described as "gold rush' in higher education [14]. MOOC provides learning opportunities for students worldwide to participate in the classes from universities via instructional video and presentations through open and free courses such as simplification game development course for the purposes of the self-development of knowledge. Many researchers also agree that MOOC now represents a great chance for blended learning scenarios, either at school or universities [14-15]. Thus, self-organized learning provides collaboration, interaction, feedback learning environment between teacher and learners. Students are able to choose or customize content, plan and organize learning, monitor their own learning activities and collaborate with each other in self-organized learning environment.

To ensure the suitability of MOOC and self-organized learning in simplification game development course, the researcher had conducted a preliminary analysis on the readiness of learners to learn game development and their perceptions on game development tool and their thoughts on simplification game development course. The next section discusses the analysis results.

3.0 RESEARCH METHOD

The main objectives of this preliminary survey is to determine the potential of game development course and the results can be utilized to improve the quality of digital game design course by implementing relevant framework which is ideally simple for novice or beginner who is interested in the game development course. This analysis is conducted at Taylor's University. The preliminary survey is an electronic questionnaire form and is implemented by using Google Forms. The data from the printed forms was transferred after completion to the electronic platform. This electronic questionnaire form was shared out via one of the popular social media, Facebook and through offline means which involved approaching students in computer labs and the library. Five-point Likert-scale items (1-strongly disagree; 2-disagree; 3-moderate; 4-agree; 5-strongly agree) are indicating for some questions such as the perceptions on GBL as viable learning tool.

There are 155 students as the respondents for this analysis. According to Sekaran [16], 30 to 500 sample size is suitable for most studies. The survey consisted of up to four parts: background information, perceptions on game development course, features on game development tool and why they were not interested in the game development course. A pilot test to determine the validity and reliability of the survey instrument was carried out with 5 game experts. The Content Validity Ratio (CVR) for the instrument is +1.00. CVR is a method used to test the content validity of the instrument using the formula $CVR = (2n_g / N) - 1$; n_g = number of experts who give positive or great grading for instrument items and N = total of experts who give grading for instrument items.

Part one consists of six questions regarding their background information that can help to identify the current demographics taking the survey and can help identify the respondent's current exposure towards game development and game-based learning activities in education. Part two of the survey contains four questions regarding their perceptions of game-based learning and game development. In this part, a question is asked regarding to their interest in participating in a game development course, which determine the direction of the survey.

For respondents who said yes, they would have to proceed to four questions regarding a game development course structure that they are be interested in, as well as identify their motivation for participating in a game development course. There are three questions regarding game development tools which they are used with one question requiring respondents to identify the important features of game development tools which they value higher than others. As for respondents that answered 'No' for their interest in participating in a game development course, they will be directed to answer three questions regarding the reasons and factors on why a game development course does not appeal to them.

4.0　RESULTS AND DISCUSSION

In this preliminary survey, 75% of the respondents were male, while 25% of the respondents were female. Majority of them (37%) are currently undergoing their second year of undergraduate studies. Most of the respondents have been exposed to video games and are still actively engaging in this form of entertainment with 43% of respondents playing computer games on a regularly basis and 41% of respondents playing computer games on occasion. However, the results show that 68% of respondents have not generally been exposed to game development or anything relevant to it. The common reasons would be because lesser opportunity is given for engaging in game development. The data that has been collected shows interesting trends in user's perceptions on applying game-based learning in education and interest in game development courses. It is noticeable that a large portion of respondents (72%) who have not been exposed to game-based learning in their schools or program, showing a slow development and propagation of this form of learning in many of the schools at Taylor's University. This data has shown that many schools or programs do not offer game-based learning elements in the syllabus. In fact, certain students from the same school undergo game-based learning depending on the subjects that they are taught. However, student's perception towards game-based learning is surprisingly positive with 72% of the respondents (refer to Figure 1) agreeing that it is a viable teaching tool

for classrooms. This is because most of them may explore digital games, mobile games and computer games that are fully entertaining and motivating them since the game software is the fastest growing industry as mentioned in the introduction. This reduces the barrier of resistance when game-based learning is introduced in schools as a large portion of students is open to the idea that it is in fact an effective tool to be implemented in classrooms.
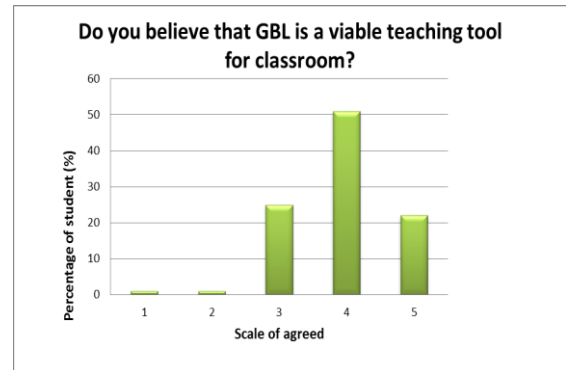

Figure 1 Graph bar results for perceptions on game-based learning as a viable teaching tool

The next focus of the preliminary analysis is the concerns that the recent perceptions on game development for creative learning. The perception of game development is varied but the majority, 43% of the respondents still felt that it was a challenging but fun process (refer to Figure 2).
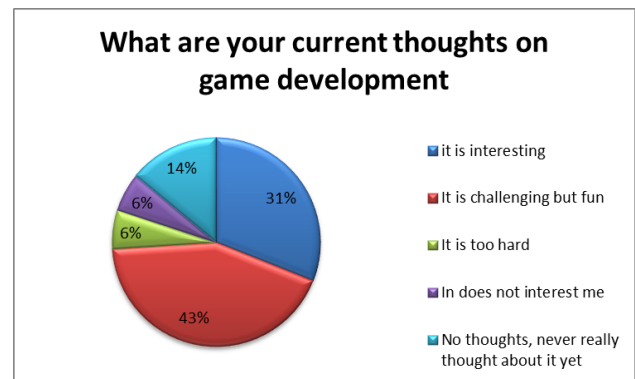

Figure 2 Pie chart results for current perceptions on game development

This also translated positively in their perceptions on how viable a tool for game development for creative learning, which shows 77% of respondents agreeing with the notion. Unfortunately, not all of the respondents who perceive game development as a viable teaching method were particularly interested in participating in a game development course, with only 66% of the group showing interest in joining a game development course. Nonetheless, the

percentage is still above average which indicates a positive reception for the course.

For the respondents who were interested in participating in the course, there are two forms of course structure that were preferred by majority of the respondents. Respondents chose elective subject (35%) and external workshop (32%) to be their preferred course structure for the game development course. Within the course, laboratories are to implement a game and collaborative exercise for game design and creation which are the two highest voted types of classes by respondents, with the same percentage of 42%.

The game development tool or framework of preference was also evaluated by respondents by rating specific features of a game development tool following its importance. The summary of the results are shown in Table 1 in order of importance in percentage. The results show that respondents rated ease of use, community support and multi-platform support of a game development engine as their three most crucial features, while version control, analytics and monetization features are rated as not particularly important.

For those who disagreed with game development course, they proceeded with three questions to identify the reasons or factors that show why they are not interested to join the game development. Majority of the respondents felt the lack of interest in game development was their primary factor for not joining in a game development course. This is followed by the lack of time (18%), since most of the respondents are caught up with their current studies and assignments it is difficult to allocate time for a game development course. Uncertainty of the subject and the lack of idea for a game to begin with both formed 17% of the group each. The remaining group of respondents felt that game development was too complex (12%). Certain groups face external factors such as monetary (6%) and lack of peer support (1%) to encourage them into a game development course. Uncertainty of the subject and the lack of idea for a game to begin with both formed 17% of the group each. The remaining group of respondents felt that game development was too complex (12%). Certain groups face external factors such as monetary (6%) and lack of peer support (1%) to encourage them into a game development course.

Table 1 Summary results for specific features of game development tool

Feature	Percentage
Ease of use	81%
Community Support	66%
Multi-Platform Support	64%
Customer Support	64%
Advanced Features	57%
Tutorials/Training	55%
Mobile Support	48%
Price	42%
Console Support	40%
Documentation	40%
Asset Support	39%
Version Control	37%
Analytics	30%
Monetization	27%

Therefore, the research objectives are to identify current game development tools that can facilitate in the simplification of game development for students, to understand students' perception on game development and their interest in engagement with it and determine obstacles and hurdles they face in embracing it, and to establish learning possibilities and solutions that can be incorporated into a university program and from these tools it can invigorate creative talents of students. Researchers in areas related to gaming have identified unique skills and competencies that are needed for students wishing to pursue computer science, and especially gaming as a career. These areas include obtaining an appropriate level of education, having experience, the development of problem-solving and communication skills, developing software and programming, and supporting knowledge in areas associated with computer technology, mathematics and graphics [17].

5.0 CONCLUSION

In conclusion, there is a large amount of students (77% of respondents) who give positive perception and interest with game development course. Most of them feel that the recent game development course is challenging and fun. Ease of use features are most important criteria in game development tool from the analysis of results. Therefore, MOOC is proposed to be used as a platform to teach game development course which is able to encourage students' learning and ubiquitous learning among students. Simple, affordable, customizable and ease-to-use features of MOOC are really used to show how disruptive innovation can affect the future of teaching and learning. The application of MOOC enables students to learn what they want, no boundaries of time, space, cost, age and background. Students who partake in this new framework will have the opportunity to learn gaming

through unconventional means such as visual programming which eliminates challenges when it comes to language specific issues. Having a program which is exciting, new and most importantly, relevant, to students for a computing school will help improve enrolment and reduce attrition rates of students as students are engaged in creative learning and content creation.

Acknowledgement

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