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STUDENT'S HABITS AND PREFERENCES IN DIGITAL GAME : A CASE OF DESIGNING AN EDUCATIONAL GAME FOR PRIMARY SCHOOLS STUDENT

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Abstract

The embedded technology in learning for primary school students is seen as a paradigm shift in education. However, in developing countries, technology is more actively utilised in higher education and secondary schools rather than primary school. Digital game, on the other hand, is much preferred by primary school students after their school time. Educational games or even entertainment games can be found online or in the market, however, most of the designs are not user centric. This paper will further discuss the initial study phase which was done to; (1) identify student's habits towards digital game usage; (2) identify digital game design preferences by students and; (3) purposive sampling findings. This investigation is to identify interested and capable students in engaging future digital game design activities. In order to further investigateon students' habits and game design preferences, we will use the first phase of PDEduGame framework process. Hence, a preliminary investigation was done with 287 primary school students aged 10 to 11 years old. The Islamic Religious Primary School (KAFA) in Selangor District was selected for this investigation purposes. The next part of this study is the elaboration on the methodology used during the investigation. Some teachers were interviewed to support the investigation. The results from the investigation will be further discussed and elaborated in the descriptively. Finally, from the results, we suggest the input generated for the initial study stage for the second stage of the participatory design framework process.

Keywords: Game Design, Participatory Design and Educational Game

1.0 INTRODUCTION

In developing countries, technology in learning is more extensively used in higher education compared to the secondary or primaryschools classroom due to the implementation and cost constraints. Despite of teachers and studentswho are considered as technology-savvy in this modern living, open online application in education is available to cater teachers and students needs to learn outside from schools period.Even both teachers and students have their own technology devices and can handle the online application skilfully. Primary schools students are usually more attached to digital gadgets such as mobile phones, tablets, PCs, or notebooks. Game is one of the most preferred applications by students; the purpose of playing can be for education or entertainment. For the case of primary school students in Malaysia, they use technology device after the school period, where some parents allow their children to use digital devices at specific times for open online learning or games. However, not most of the educational game contents are tailored according to schools education content and student's preferences. Some educational game features may differ with entertainment game, which divertstudent'sattention to enjoy entertainment game features and suitable with their moods rather than educational serious game that is more rigid and contains more educational contents. This can be elaborated in a few factors, including suitability of the open online game to education curriculum or content, game design elements and etc. Students perspectives on educational game design can be specifies on their preferences on the game design issues. Therefore, this study is an initial study to identify the student's habits and preferences in digital games design. The next section of this paper will be discussed on problem background, which identifying the issues arise and respondent selected in primary schools in Malaysia. In the methodology section, we will focus on the participatory design process to identify input from 1) student's habits and 2) game preferences for the future activities to design educational game. More details on research design will be discussed in the next section and discussions on finding will be place afterward. The discussion will elaborate on how the student's habits and preferences can support digital game roles in primary schools education. The findings will be used later for future participatory design (PD) processes in designing educational digital game for primary school students. Thus, we will employ the first stage of PDEduGame framework, specifically to study the student's habits and preferences on digital game.

2.0 PROBLEM BACKGROUND

Game was seen as a distinctive advantage when compared to traditional teaching styles. Game can be classified as entertainment or educational purposive. In designing an educational game suit for primary schools students, we need to study the competencies and preferences of primary school students in games. Therefore an investigation activity will be highlighted in PDEduGame process

framework at the initial stage. There are two main issues, which covers on student's habits in digital game and student's preferences in game design.

Student's Habits in Digital Game

To decide whether the digital educational game is suitable for the primary schools students or the opposite, we need to understand the student's habits in digital game. There are also some studies in educational game that can motivate students in learning, however there is also a need to identify the student's habits towards the digital game. The issues will be covered in many perspective albeit the types of games, such as to what extent of period do the students play the digital game, what type of digital device they own to play the digital game, which game they prefer to play and accessibility of the game. These issues will be covered in a survey and discussed further to summarize the suitability and potential of educational game for primary schools students.

Student's Preferences in Game Design

In designing the game, many leave it to the hands of games designer or design expert. However, recent study shows that most of the application or games development are much more towards users centric. Identifying what the students prefer in an educational game, whether the game elements or its features, is needed to find the design features based on the user centric. Human computer interaction (HCI) was known as a method that uses to analyse the users as a central for the technology design and development. Several techniques are found under the HCI subject when focusing on target user, for examples students or children. Participatory design is one of the technique uses, popular with collaboration or co-design technique with target users as a central of the attention while guided with a facilitator or stakeholder. Therefore, the main problem of identifying the design features based on users centric will initiated by undergoing the preliminary investigation of survey on identifying students preferences in game design.

■3.0 METHODOLOGY

The interrogation on student's preferences on educational game design was realised at the first phase in PDEduGame process framework. This process framework was used to identify digital game preferences and how digital games can be tailored for education with entertainment purposes using participatory design technique. Some features of a game can be fun, exciting or challenging. Adults, teenager and even children are much into games. However, children are seen enjoying the game at their fullest, being it was an educational type of game or entertainment game. Thus, in this study, children are the most prominent target respondent to our study. Most of the children who were suggested for this survey, were available and gave respond to this investigation are at age of 10 and 11 years old. Majority, students at age 12, were facing final examination, thus it is not advisable to scout them for the investigation purpose. In this paper, we will cover the part of the first phase inPDEduGame framework process, known as the initial study (Figure 1). Since Department of Islamic Religious of Selangor District had given their consent on doing the research, thus we decided to select three Islamic Religious (KAFA) primary schools students for the investigation purposes using a survey. Questionnaires survey wasdone in the initial study phase, and its purpose was to support the later process of game workshop-setting process. The questionnaire was divided into three sections: (1) students' habits towards digital game, (2) game preferences, and (3) consent letter for design workshop participation. The research encompassed questionnaire surveys from 287 students and brief interview with 9 teachers.

Brief Interview Session

Interviews with nine teachers from three different schools were conducted briefly. From the conversation, teachers from each primary school's suggestedon the Islamic history education as for the game content. Following the final examination results with a slight decrease in the statistics for Islamic history subjectin 2016 and 2017, the teachers agreed that the subject did require a lot of fact memorisation through reading. We referred to the statistics of the primary school final examination by region in 2017; most students found difficulty with the history subject. Thus, placing the Islamic history content for the game can be an example for future testing phase and evaluation needs to enhance the student's motivation. Since the selected students age 10 and 11, thus the educational content can refer to standards four and five moduleto be placed as example in the game content.According to the teachers, after-school activities such as educational game are also needed to get the students to do exerciseand motivate to learn about Islamic histories and facts.

Figure 1: PDEduGame Process Framework
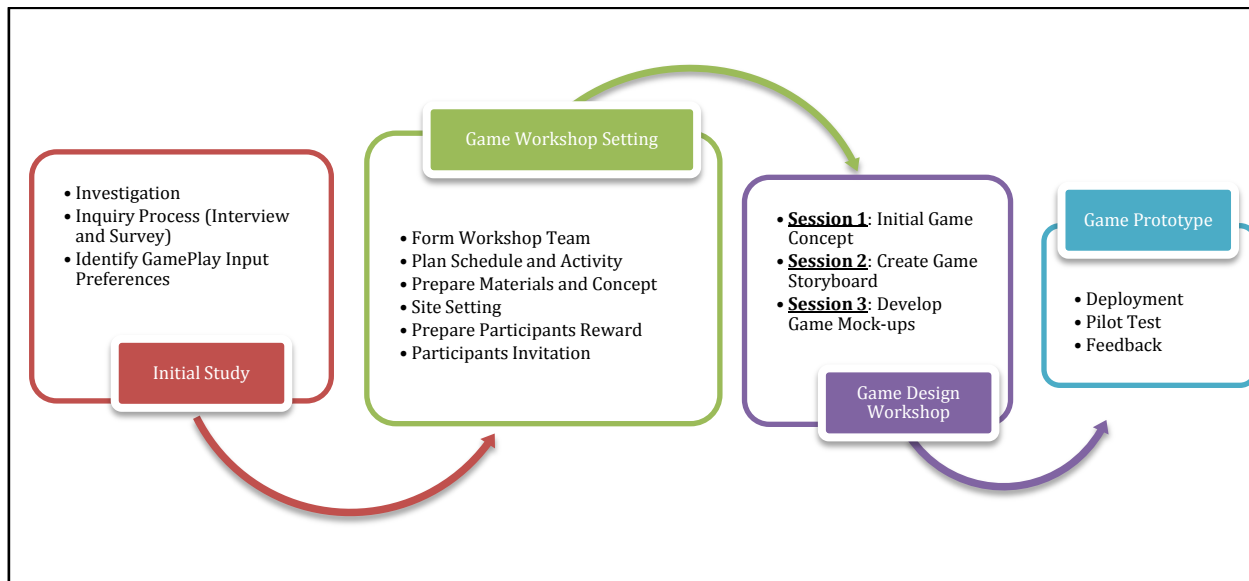
Purposive Sampling

To identify students for the game design workshop phase, purposive sampling was used in the initial study phase as shown in Figure 2. The purposive sampling purposely identified eligible students for the next stage for the PD process. After the purposive sampling was done, the collected data will be forwarded to the next phase of the game workshop setting. In this phase, we will sort the data collected and triangulate the eligible students with their examination results. We have various participants with unique education backgrounds and game design preferences. The triangulation of game design preferences and examination results background will be done later in the second phase of PDEduGame.

Figure 2: A total of 287 students from KAFA Primary Schools participate in the survey

Triangulation Design

In supporting the analysis of the data gained from the survey, a triangulation will be done with the teachers interview. This is to confirm that the design preferred by the students is aligned with the content approved by the teachers. Later, these surveys and interviews will be an input for the game workshop setup phase and game design phase. The game design preferences are included and the components are identified from Mechanics-Dynamics-Aesthetics (MDA) Game Design Framework. Since we did not do any evaluation testing on specific digital games, the questions in the survey were formalised based on students' general experience on any game they have played before. The game design or aesthetics is also featured in the survey to identify the students' need and feeling while playing digital game. Teachers also responded to what the term of "good game design" means in designing educational games, especially in Islamic Religious education content.

■**4.0 FINDINGS**

There are three parts that will be covered in the findings. Table 1 summarises all the findings. The first part is a brief conclusion on teachers' perception on digital game application for the learning process. It was agreed that the game application could be applied for history subject, since the examination results showed a slight decrease in 2016 and 2017. The KAFA primary schools operate in two sessions, morning and afternoon sessions. The time duration for each session is shorter than the public national primary school, thus technology usage in classroom is limited. Therefore, the teachers suggested that the usage of educational digital game should be done after the school hour on students' leisure time at home. The second part of findings is the short survey done in three different KAFA primary schools. Each school gave full support during the data collection process. The first subsection of the survey was to identify student habits related to digital games. From the survey, 55% of students own a digital device. Only 3.8% from the total students are not into digital games. There are several reasons why they play digital game, and the highest percentage shows that they are bored, seeking for a fun thing to do, and because the game is challenging to them. The second subsection of the survey is focused on game design preferences, including game genre and game elements. As shown in Table 1, 38% prefer puzzle-like games, and the game should be fun (47.7%), challenging (43.6%), and illustrated with beautiful colours (27.9%). The third part is the participation for the game design workshop. In this part, the students stated if they would agree to attend the incoming event of game design workshop. 68.3% (n=196) of the students were interested to participate, however, only 46% (n=132) agreed to attend the workshop during the weekend.

Table 1: Initial Study Phase – Input for the consecutive PDEduGame Process

PHASE 1: Initial Study	METHOD	FINDINGS
PART 1 Inquiry Process to identify teacher's opinion on digital game for educational purposes.	**Interview –** School 1 – 3 Teachers School 2 – 3 Teachers School 3 – 3 Teachers	1) Nine teachers are agreeable on digital game usage on history education subject, since the subject need more exercises and fact memorizing. 2) However, it is much preferred if it could be applied after school time and with parents monitor. **Note:** Each school agreed to attend game design workshop as a representative and involve with the activities.
PART 2 (A) Inquiry Process to identify digital game playing habits.	**Questionnaires–** School 1-124students School 2-118 students School 3-45 students	**1) Digital Device Ownership** 55% from the total sample own a digital device **2) Reason for Playing Digital Game** Bored 53.3% Fun 46.7% Challenging 45.6% **3) Frequency of Playing Digital Game** a) 5Hours Above = 8.7%, b) 3-4Hours = 10.1% c) 2-3Hours = 9.4%, d) 1-2Hours = 17.4% e) 30Minutes – 1Hour = 17.1%, f) Less than 30 Minutes = 33.4%, g) Not Playing = 3.8% **Note:** Fun criteria are much anticipated in the educational game design. Parent's restriction applicable.
PART 2 (B) Inquiry Process to identify game design preferences.		**1) Game Genre Preferred** Puzzle 38% Maze 29.3% Board Game 24.1% **2) Game Elements Preferred** Fun 47.7% Challenging 43.6% Beautiful Colours 27.9% **Note:** Fun criteria are much anticipated in the educational game design.
PART 3 1) Inquiry Process to identify 15 students to attend game design workshop. 2) Documentation Review	**Purposive Sampling** 1) Willing to participate 2) Total hours spend in playing digital game. **Document Review** Students Final Examination results	1) Students who want to participate for the game design workshop. 2) Frequency of playing digital game is higher. 3) Final examination results. **Note:** This data collected will be sorted and triangulate in the second phase of PDEduGame.

■5.0 DISCUSSION

The findings shows that, there are three parts in discussion. The first part is the student's habits towards digital game. Almost 55.5% of students owned a digital device. This result also comes with a brief explanation from the students that the digital device is for communication, emergency contact or any relevant to education discussion through mobile phone. Results show that most parents trust the students with the digital device and for the good purposes. Based on another result, only a few students that denotes of 3.8% do not play digital games, and majority of 96.2% of them play digital games. The questions then narrowed to a few factors listed which are; the students play digital games because they are bored and the game bring fun and enjoyment during their leisure time. A few of the students state that the gameconsidered as a challenging activity for them. The results that represent the student's habits strongly show that almost all of the students are willing to participate in digital game playing. Therefore, enforcing educational game for history subject as an after-school activity is also can be considered as a potential tools to enhance the student's motivation in particular subject, and for this case game content example is Islamic history subjectat primary school level. Even though the educational game can be played during leisure time or after school, monitoring processes from parents are needed. Based on the statistics shown in Table 1, a total of 77.3% of students play digital games for less than 3 hours. This shows that the parents' restrictions on their child in regard of digital game playing are already enforced at home. However, some other concerns from the survey are the fun elements anticipated by students in educational game. Thus, to confirm that the future design of the game can complement student's preferences, the survey was then elaborated into student's preferences in game design.

The second part of this study is the game design preferences, where most students prefer a fun game, a challenging game, and a game with a good representation (illustration and colours). These three categories were then elaborated into its specific genre. It was identified that a puzzle and maze type of genre was most preferred by students. Some game elements selected by students are fun 47.7%, challenging 43.6% and beautiful colours 27.9%. Fun is much relevant in entertainment game compared to serious game or educational game. However, in designing an educational game with fun elements will need specific details of fun elements from the students and how they want it to be in the design. Therefore, as mentioned earlier in methodology section, the participatory design process is much suited to collaborate the students, teachers and designers in organizing and generating their ideas of fun elements and some other preferences in the game mock-ups. This game mock-ups will be later execute in the game workshop design phase of Figure 1. The involvement of the students can be maximized to 10 or 15 students in a workshop due to time constraints. Thus a proper selection on the students will be emphasize in the later section, which is selection of students and their consent to participate in the design workshop.

The third part is the student selection for game design workshop. This section of survey is to identify interested and capable students in engaging in designingeducational game activities. We will select the students based on the student's habits criteria, their game preferences, willingness to participate in the design activities, and their final examination result. 62.7% of students who play games more than one hour to five hours and above will be processed for the selection. Later, we will match the selected students with the students with higher examination results, another five students with average results, and another five students with below-than-average results. This is to ensure that the game playing habits and the examination results are shown from different perspectives of students in design participation.

■6.0 CONCLUSION

In summary, the result from the student's habits and preferences in digital game creates an opportunity for the primary schools to apply the digital educational game after-schools. The results stated previously are potential input to be used in designing the educational game for the next phase of PDEduGame framework process. There will be more work to be done for each consecutive level in the PDEduGame framework. This study only covered the initial phase. Thus, we would like to suggest that each output and finding from the initial phase would be mapped with the next phase in the framework. For future research, the framework can also be applied in the higher education area to enhance educational game design in order to support the design of blended learning method.

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