Evaluation method of experiential learning on MGBL

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ABSTRACT: The use of smartphones and tablets among early childhood is increasing rapidly. Various types of applications are developed and designed specifically for early childhood. While most of them are built related to educational purposes. However, it is believed that a comprehensive evaluation method is needed to ensure that the educational game (MGBL) can give contribution, not only to user's enjoyment, but also to the learning process. By adopting Design Science Research approach, this research can provide a suitable evaluation method as the outcome to give solution for the current problem. Five phases will be carried out in this research, such as (i) awareness of problem, (ii) suggestion, (iii) development, (iv) evaluation, and (v) conclusion. Later, this evaluation method can be defined as a guideline to evaluate experiential learning on MGBL.
KEYWORDS: learning experience, evaluation, educational game, MGBL

INTRODUCTION

The use of smartphones and tablets among early childhood is increasing rapidly. Various types of applications are developed and published to present entertainment as well as education, designed specifically for early childhood users. Parent endorsement of these technologies has created a multimillion-dollar industry, however, the claims of their educational value have not been supported and proven.

Based on a survey conducted by Malaysian Communication and Multimedia Commission (MCMC, 2015), 33.9% of the respondents' children (0-18 years old) own a hand phone. Then, 57.6% of them own a smartphone. Figure 1 illustrates the percentage distribution of age on children's hand phone ownership.

A study conducted by Courage and Troseth (2016) indicates that parent scaffolding plays important rule to help children understand the connection between information on screen media and real life. It determines the effectiveness of children interaction with the screen media. As infants and toddlers interact with screen media alone, they may be entertained but may not learn. Thus, parents assistance and accompany will optimize children's learning potential.
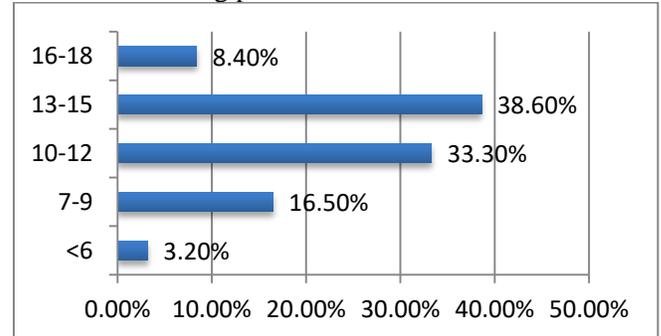
Reference: MCMC, 2015
Figure 1. Percentage Distribution of Age on Children's Hand Phone Ownership

Mobile game based learning (MGBL) has been introduced to the children at home and in school environment. This technology is surely changing the way children learn and have fun. MGBL aims to enhance learning motivation, involve in knowledge acceptance, and improve effectiveness of learning activities through mobile environment (Zaibon & Shiratuddin, 2009).

To ensure that MGBL can enhance the quality of learning, a study on the suitable method of

evaluation is needed. Omar and Jaafar (2011) agree that it is essential to develop a comprehensive evaluation method, to ensure the game's contribution to the learning process and user's enjoyment.

Research Problem

Various evaluation methods of MGBL have been suggested by many researchers. Most of those methods are related to the usability and playability of the game (Mohamed & Jaafar, 2011; Zaibon & Shiratuddin, 2010; Korhonen & Koivisto, 2006; Desurvire et al., 2004). The experts inspect and examine the game usability and playability by using a list of heuristics to identify problems.

However, there are limited studies that focus on evaluating the game playability as well as the learning process. Contribution of MGBL to the learning process can be measured by evaluating the learning experience of the users. Therefore, experiential learning of the users needs to be examined in order to find that whether the MGBL is successfully give positive contribution to the learning process.

Research Objectives

The main aim of this research is to develop an evaluation method that can be used as a guideline to assess experiential learning of MGBL. There are three objectives of this study, such as: to identify the factors of successful experiential learning on MGBL, to develop the proposed evaluation method, and lastly to validate the proposed evaluation method.

LITERATURE REVIEW

Game Usability Heuristics

Game usability evaluation focuses on assessing user interface of a game. This evaluation is conducted to ensure that the game can be played by users to achieve goals with effectiveness, efficiency, and satisfaction in a specified context of use. By performing usability evaluation, Ferrer et al. (2013) proved that their proposed AR serious game can give positive impact to learning effectiveness and enhance user's motivation to learn.

Many other studies have been done in developing and conducting game usability

evaluation. Game usability evaluation method is usually conducted by some experts to identify problems through some usability heuristics. According to Mei, Ku, and Chen (2015), experts and users perceive the interface of game-based learning system differently. It concludes that both expert inspection and user assesment are complementary to each other.

Mohamed and Jaafar (2011) proposed a tool in form of an online system, called AHP_HeGES. This online evaluation tool can be used by various background of experts to conduct evaluation process. This tool covers five heuristics, such as interface, educational element, content, playability, and multimedia.

Similarly, Eagle (2009) developed *Level Up*, a framework used to design and evaluate game-based education learning environment. This framework provides both guidelines in developing effective educational games, and evaluation system that can be run to assess the games that has been produced.

Game Playability Heuristics

Even though many studies have approved that usability heuristics provides various benefits in game design process, some researchers argued that it is important to assess the game more than the basic interface game usability evaluation (Desurvire, Caplan, & Toth, 2004; Korhonen & Koivisto, 2006). Some other additional elements are needed to be evaluated, such as game play, game story, and game mechanics.

Heuristics Evaluation for Playability (HEP) proposed a total of 43 heuristics that divided into four game heuristics categories, such as game play, game story, game mechanics, and game usability. On the other hand, Playability Heuristic Model, introduced by Korhonen and Koivisto (2007), contains 29 heuristics. This Playability Heuristic Model consists of three modules, such as gameplay, game usability, and mobility. These playability heuristics sets are proved effective in finding game playability issues.

Experiential Learning

Experiential learning involves learners' perfoming an activity and then processing that activity to make personal and global connection

to the learning. John Dewey (1938, as cited in Yonghui & Hui, 2009) believed that learners gather information from observing their surroundings, reflecting on past experience to acquire knowledge, and then present judgment based on the combination of knowledge and observation. Kolb illustrated this learning concept into Figure 2 below.
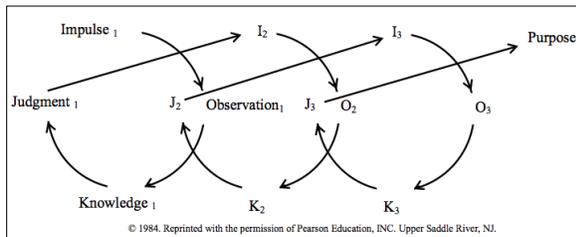

Reference: Kolb, 1984
Figure 2. Dewey's Model of Experiential Learning as Conceptualized by Kolb

David Kolb (1984) extended the research of Dewey and others by introducing the Lewinian Learning Model that consists of four-stage countinuous cycle. It includes concrete experience, obsercations and reflections, formation of abstract concepts and generalizations, and testing implications of concepts in new situations. Kolb believed that these stages are an ongoing cycle of learning, integrating, knowing, and doing. Figure 3 illustrates Kolb's cycle.

Generally, experiential learning models have similar chronological cycles, such as (i) doing learning participation, (ii) sharing experience, (iii) processing experience, (iv) making generalization, and (v) applying what has been learned to new situation (Yonghui & Hui, 2009). This chronological cycle is illustrated in Figure 4.

Fitchat and Jordaan (2016) introduced ten heuristics that can be used to evaluate user experience of serious games. These heuristics can also be used by game developer during the design process to develop a learning environment that is both effective and fun.
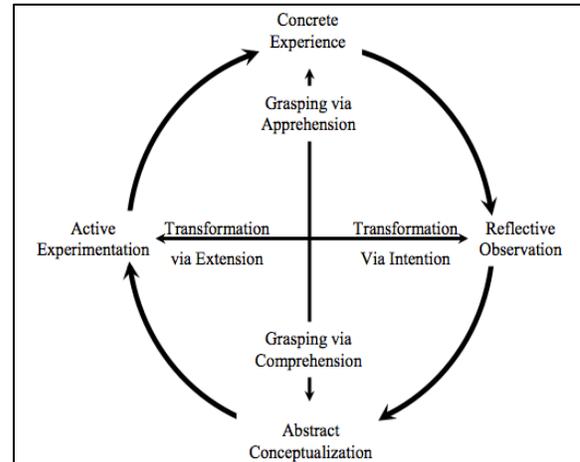
Reference: Roberts, 2006
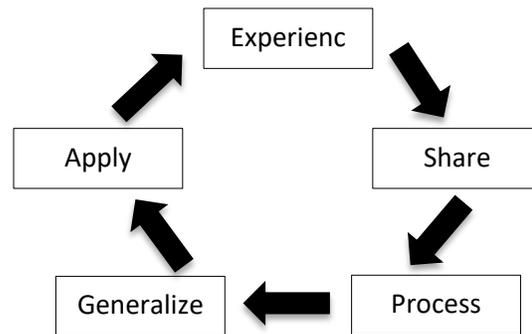Figure 3. Model of Experiential Learning Process

Figure 4. Experiential Learning Model

PROPOSED METHODOLOGY

Design Science Research (DSR) is chosen to assist this research in producing a method as the expected outcome of this study. This methodology suggested by Kuechler and Vaishnavi (2008) is adopted to carrying out the research steps and achieving the research objectives. Five phases will be performed, such as (i) awareness of problem, (ii) suggestion, (iii) development, (iv) evaluation, and (v) conclusion. Those phases are illustrated in Figure 5 below.
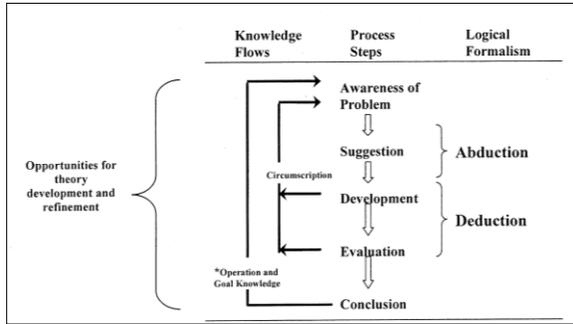
Reference: Vaishnavi & Kuechler, 2008
Figure 5. Design Reseach Cycle

Phase 1: Awareness of Problem
The first phase of the research starts with intial study on the current trends and technology, which leads to the recent problems occured in the field. Literature review, content analysis, as well as comparative studies on the existing evaluation method of educational games and experiencial learning area are done to obtain a prospect gap for the study. By the end of this phase, the proposal of this study is suggested.

Phase 2: Suggestion
For suggestion phase, the outcome from the previous phase will be used to compare and document the components and characteristics of proposed evaluation method. Comparison on evaluation methods of experiential learning, as well as MGBL evaluation methods will be conducted to offer contribution to the principles of the proposed evaluation method. Furthermore, studies on the flow of MGBL evaluation method,, characteristics of MGBL and characteristics of NUI are also taken into account to determine the appropriate solution for the proposed evaluation method.

Phase 3: Development
Finally, after all data are gathered, the production of the proposed evaluation method can be conducted in development phase. Some phases of MGBL evaluation method will be incorporated with the component of experiencial learning. Later, this combination will be converted into the first version of proposed method of evaluating experiential learning for MGBL. Expert review will be conducted to determine the reliability of the proposed

evaluation method regarding its components, phases, and concept.

Phase 4: Evaluation
Then, the evaluation of completed final version of the proposed evaluation method will be conducted through experimentation. The proposed evaluation method will be performed on a selected MGBL application. The experiment will involve a group of participants (4-6 years old children) to validate the performance of the proposed evaluation method.

Phase 5: Conclusion
For the last phase, all result will be justified through analysis of findings. Report writing and publication will be carried out.

CONCLUSIONS

From the literature review, it was found that there are a few game evaluations that involve experiential learning process as well as the game playability itself. However, experiential learning of the users needs to be examined in order to find that whether the MGBL is successfully give positive contribution to the learning process.

A conceptualization and construction of a suitable evaluation method is currently underway. By adopting Design Science Research method, this research is expected to develop an evaluation method to assess experiential learning on MGBL. Later, this successful evaluation method can be defined as a guideline that can be used by other game designers in the development process. It includes designing process and evaluation process. This research also compared several experential learning theories and evaluation methods. The results generated hopefully will provide significant analysis and new knowledge to other researchers or future studies.

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