Do Usability Design Features of a Mobile Game Influence Learning?

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INTRODUCTION

Mobile learning allows learners to construct their own learning experience (Bandalaria, 2007). This form of learning empowers students to develop their own skills and knowledge (Sharples, Taylor & Vavoula, 2007). Students, through the use of mobile learning, may create opportunities to learn anytime and anywhere (Martin & Ertzberger, 2013; Sanchez, Mendoza, & Salinas, 2009) and can connect that learning experience to real life situations. Recently, games have been integrated in mobile platforms. Educational technology developers combined the entertaining components of games with educational contents in order to develop games for pedagogical purposes.

However, the existing threads of discussion on serious game usability do not provide evidence as

to which of the usability features of a mobile game can influence student learning. This chapter aims to address this issue. A serious game in disaster response was developed and utilized by first-year students. The goal of this paper is to find answers to the following questions:

1. What is the knowledge of the disaster response participants before and after playing the game?
2. What is the learning gain of the students after playing the game?
3. What are the perceptions of the participants in the usability of the game in terms of content, ease of use, usefulness, and aesthetics?
4. Is there a significant difference between the knowledge of students on disaster response before and after playing the game?
5. Do the usability factors, singly or in combination, influence the knowledge of the participants in natural disaster response?

BACKGROUND

Mobile games can be utilized to channel information and learning. Games with educational content may engage people to play and learn at the same time (Muratet, Torguet, Jessel, & Viallet,2009). Studies have documented the positive results of mobile games as educational tools. Batson & Feinberg (2006) showed that students who used educational games had a positive learning experience. Mobile educational games also improve the motivation of students to learn and to have positive attitudes towards learning (Tuzun, Yilmaz-Soylu, Karakus, Inal, & Kizilkaya, 2009; Salter, Pittaway, Swabey, Capstick, & Douglas, 2012). Chow, Woodford & Maes (2011) also revealed that the use of mobile educational games improved students' retention, critical thinking skills, and understanding of the content of an introductory statistics course (Chow et al., 2011). Moreover, it was proven that these educational materials can improve learners' problem solving

skills and can promote collaboration among them (Sanchez & Olivares 2011). Recently, Connolly, Boyle, MacArthur, Hainey, & Boyle (2012) summarized the results of 129 studies that investigated the impacts and outcomes of serious games on learning and students' classroom engagement. The researchers consistently found that playing serious games were associated to knowledge acquisition, content understanding, and affective and motivational outcomes.

Learning of students could also be measured in terms of learning gain. Learning gain is the measurement of performance in a test as indicated by the percentage points a student can gain from the first/previous test to the second/recent test (Colt, Davoudi, Murgu, & Rohani, 2011; Steif & Dollár, 2009). Rodrigo et al. (2013) utilized this measure to show that learning gains could be influenced by the ability of the students to solve problems. Bringula, Alvarez, Evangelista, & So (in press) used this measure to determine the impact of a mobile learning software on the mathematics performance of students. They found out that after using the mobile learning software, students increased their mathematics performance by 41%.

Various design models and guidelines were proposed in an attempt to guide educational game developers to develop serious games (e.g., Billi et al., 2010; Bringula, Alcid, Bandril, De Guzman, & Lopez, 2014). The goal of these models and guidelines is to balance the entertaining and educational components of the mobile game (Kreutzer, Marks, &Bowers, 2015). Usability of mobile games was explored in an attempt to warrant that the end product will be functional and playable (Olsen, Procci, & Bowers, 2011; Warren, Jons, & Lin,2011). In an educational point of view, the purpose of the exploration of serious game usability is to ensure knowledge transfer (Kreutzer, Marks, &Bowers, 2015).

There is no universal definition of usability (Sindhuja & Dastidar, 2009). This is because usability is dependent on the content and nature of the systems being investigated. In mobile games

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