Chapter 18
Can Pre-Service Teachers Create Digital Game-Based Activities without Coding Knowledge?

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ABSTRACT

This chapter examined five cases of pre-service teachers' abilities and attitudes towards creating and using digital games in their future teaching. Participants included five pre-service teachers at a Midwest public university. The participants underwent the same research procedure including: pre-project open-ended interview, training session, and post-project open-ended interview. The researchers analyzed participants' responses to the interviews and the quality of the games they created, using the Educational Electronic Games Rubric. Results showed that students not only enjoyed learning about digital games, but also were able to create quality games without coding knowledge or advanced technology skills. Five participants indicated that they plan on creating and integrating digital games into their future teaching.

INTRODUCTION

I'm calling for investments in educational technology that will help create… educational software that's as compelling as the best video game. I want you guys to be stuck on a video game that's teaching you something other than just blowing something up. - President Obama, March 2011

Interest in game-based learning and integrating digital games or video games into education has risen in recent years (Garris, Ahlers, & Driskell, 2002; Moreno-Ger et al., 2008; Shaffer, Squire, Halverson, & Gee, 2005; Squire, 2003; Van Eck, 2006). In 2013, more than half of the Small Business Innovation Research (SBIR) Grant/Awards from the US Department of Education were given

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to game-related projects (DeLoura & Metz, 2013). Recently the National Science Foundation (NSF) also offered many grant categories for game-related projects. Despite the priority and emphasis of integrating games into the classrooms, Epper et al. (2012) made the point that true adoption and institutional implementation of games into classrooms are still at the experimental stage. One of the biggest challenges for games to be integrated into classrooms is the fact that teachers lack the skills and knowledge to create games usable in their teaching. This suggests the need for extensive training and planning in pre-service education programs and in the schools. Most of game- creating platforms and/or programs require users a certain amount of coding skills and/or knowledge to be able to create a game applicable to classroom use. To that end, this research project seeks to solve the challenge by determining whether pre-service teachers without any code knowledge/expertise can create game-based activities usable for their student teaching after attending a short period of training, and what can be learned from that process. Specifically, the objective of the research project, which is a case study with five cases, is to answer the following research questions.

1. Can pre-service teachers without any coding skills be trained in a short period of time to create game-based activities usable for their student teaching?
2. What can be learned from that process?

REVIEW OF LITERATURE

Imagine if kids poured their time and passion into a video game that taught them math concepts while they barely noticed, because it was so enjoyable. - Bill Gates, July 11, 2012

The use of games in education is not new. In fact, there are significant number of studies conducted in the 60's and 70's addressing the use of instructional game in the classroom. The first educational computer games made their way into the schools in the 80s when desktop computers were still considered a luxury. Computer games such as Oregon Trail and Carmen Sandiego enriched the classroom dynamics through gaming features such as characters, graphics and sound. It was the beginning of a journey that paved the way to sophisticated gaming technology such as simulation and augmented reality, namely Big Brain Academy and Bot Colony. Fields such as science and engineering have used gaming as learning tools for the longest time and continue to do so because of the authentic learning opportunities gaming has offer (Holand et al, 2003). Although gaming as an educational tool is finally starting to attract the education audience, it has not always been the case. Games have been long ignored by educators and researchers due to the lack of sound pedagogical standards and the infamous drill and practice approaches to game design widely used in the past (Gredler, 1996). It is worth to note that a common theme found in both earlier studies and recent research is that although gaming strategies have not necessarily improved learning outcomes, it has, however, significantly impacted student engagement and interest in participating in classroom activities.

Why Using Digital Games? Digital gaming, a term that includes digital video, computer, mobile and social media games is believed to have the potential to transform K-12 education and beyond (Prensky, 2001; Shaffer, Squire, Halverson & Gee, 2005). Jenkins (2002) states that games offer educators resources that are likely to bring life to their lessons and to motivate students to learn through rich and compelling problem solving. The authors further explain that gaming strategies can enhance gifted teachers instead of displacing them with impersonal technology. Vu et al (2014) argue that to enable students to learn how to learn and still perform well on standardized testing, the use of digital games must be implemented in the classroom. Another recent study by Takeuchi and