

Mobile Game-Based Learning

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INTRODUCTION

The use of video games to enhance learning has been the subject of fierce debate (Guillén-Nieto & Aleson-Carbonell, 2012). Nonetheless, experts have long strived to comprehend the draw of these games and their potential role in education. Thus, there is increasing interest in the application of video games in primary, secondary, and higher education; government; financial services; healthcare; hospitality; science and technology; telecommunications; and corporate and military training (Garris, Ahlers, & Driskell, 2002), to achieve a variety of learning outcomes (Kebritchi & Hirumi, 2008). To date, findings point to the instructional benefits of video games in the areas of computer science, geography, language, mathematics, photography, and science (DaCosta, Seok, & Kinsell, 2015).

Advancements in mobile computing have helped pave the way for new video game research (DaCosta & Seok, 2017a, 2017b) in different areas of interest, to include social development, intellectual activities (Spikol & Milrad, 2008), and general learning (Facer et al., 2004; Rogers & Price, 2006). The anytime-, anywhere-, and on-any-device characteristics of mobile technology are of particular importance because they offer new opportunities to research game-based learning (GBL) that is free from space and time restrictions (DaCosta et al., 2015). That is, mobile games have the potential to bridge the gap between the

classroom and the real world by placing students in authentic places and learning situations (Costabile et al., 2008). This has, in part, contributed to what is mounting research on what could be called *mobile game-based learning* (mGBL).

This chapter offers a review of the literature on mGBL. Extending the work of DaCosta et al. (2015), the discussion includes (a) a definition of mGBL in the context of game-based learning; (b) a review of the educational benefits of mobile games, building on what is known about video games and learning; and (c) identification of mobile game examples (called out in the literature) that have been experimented with and/or used to explore learning.

To ensure scholarly rigor, the research offered here was compiled in a staged approach similar to that of primary research (Cooper, 1998). The majority of the content comes from books, academic journals, and databases. While peer-reviewed materials were foremost, other resources were also used, including online articles, as supplemental information befitting their academic stature and to provide context regarding “practicing real world examples or an in-the-trenches view” (Kinsell, DaCosta, & Nasah, 2014, p. 161). Thus, this work presents the perspectives and findings of numerous scholars, practitioners, researchers, and experts in an effort to provide a well-rounded view of the educational possibilities of mobile games.

Throughout the chapter the term *video game* refers to a game played on a personal computer

(PC) or dedicated game device, such as a game console (e.g., Xbox®, PlayStation®, Wii®) or handheld game device (e.g., 3DS®, Vita®). The term *mobile game*, on the other hand, is used to refer to a video game played on a mobile device (e.g., cell phone, personal digital assistant [PDA], smartphone, tablet). Finally, this work is not intended to debate the practice of video games in education or the use of these games in classrooms, but rather to drive forward the study of mobile learning.

BACKGROUND

What Is Mobile Game-Based Learning?

While game-based learning is a fairly recognized notion, attempts at offering a thorough description have proven difficult (Perrotta, Featherstone, Aston, & Houghton, 2013). Many explanations often consist of definitions attempting to identify the key principles and mechanics involved (e.g., Perrotta et al., 2013). At its core, GBL is rooted in the belief that games can be used in the learning process. This means that GBL is less about the games themselves and more about the educational contribution they can make, with focus on the social dynamics involved and how to best use these games to enhance learning (Perrotta et al., 2013). Building upon this idea, mGBL may be understood as an extension of GBL, fixed in the belief that games played on a mobile device (e.g., cell phone, PDA, smartphone, tablet) can be used to enhance the learning experience.

What Do We Know About Mobile Game-Based Learning?

As mentioned, the educational value of video games has long been a topic of debate (Guillén-Nieto & Aleson-Carbonell, 2012). It should come as no surprise, therefore, that studies have reported mixed findings regarding the academic

impact of these games, with contradictory findings commonplace (Egenfeldt-Nielsen, 2006). One of the major factors contributing to the difficulty in offering detailed, consistent, and concrete evidence in support of the academic benefits of video games has been the nature of the studies themselves (Perrotta et al., 2013). For example, studies have varied in their aims, ranging from the impact of video games on learning outcomes measured in the contexts of academic achievement, cognitive performance, gender, attitudes toward learning using the games themselves, acquisition of knowledge and skills, motivation and classroom engagement, to types of learning and kinds of games. Studies have also examined the educational value of video games across different domains, such as civics and society, computer science, language, and mathematics (Perrotta et al., 2013). Further, diverse conceptual frameworks and learning theories have been adopted, encompassing behaviorism, cognitivism, and constructivism approaches (Egenfeldt-Nielsen, 2006). Finally, it has been noted that many of these studies are subject to methodological flaws and limitations (Perrotta et al., 2013), which, among other challenges, have included research bias, weak assessments, short exposure times, and lack of control groups (Egenfeldt-Nielsen, 2006).

Even with these mixed findings, wide range of study topics, and methodological flaws, the positive relationships between video games and learning (Egenfeldt-Nielsen, 2006; Perrotta et al., 2013) have been no less argued. It has been offered, for example, that video games are more flexible than other media, almost naturally supporting adaptive learning (del Blanco, Marchiori, Torrente, Martínez-Ortiz, & Fernández-Manjón, 2013). This has helped promote the idea that video games can play an important role in active learning, especially in terms of critical thinking skills, knowledge construction, collaboration, and effective use of and access to information and communication technology (Ellis, Heppell, Kirriemuir, Krotoski, & McFarlane, 2006). Moreover, because video games can provide immediate

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