Supporting Motivation and Effort Persistence in an Online Financial Literacy Course Through Game-Based Learning

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ABSTRACT

The use of game mechanics and game structures when designing curriculums is gaining popularity in K-12 and higher education. More evidence is needed to determine the impact of game-based learning design on the student learning experience. This study used the IMMS instrument and user data to examine motivation within traditional courses and courses designed with game-based learning. The participants included 254 undergraduate students in two sections of the traditional course and two sections of the game-based learning course. The results showed that although students in all courses reported comparable motivation on the IMMS and similar time spent online, examination of user data indicated differences in effort persistence over the semester. Students in the GBL courses had a significantly higher number of interactions with content as compared to the traditional courses. This finding indicates that the leveling of content, adaptive release of optional content, and the ability to earn more points through a bank feature positively impacts effort persistence.

KEYWORDS
Evaluation Methodologies, Game-Based Learning, Improving Classroom Teaching, Pedagogical Issues, Post-Secondary Education, Teaching/Learning Strategies

INTRODUCTION

The research on the use of games in education has changed dramatically in the past 20 years, moving from descriptive studies on the engaging power of gaming to experimental research measuring evidence-based outcomes. In 2015, Mayer put forth a call for gaming research that asks the right questions, uses appropriate experimental methodologies and provides evidence for theories of learning and motivation. Researchers have begun to address these challenges when studying the impact of individual game mechanics or cognitive gains, demonstrating increased overall motivation and academic achievement (Hew, Huang, Chu, Chiu, 2015; Hanus & Fox, 2015; Dominquez et al., 2013; Denny, 2013). However, there is also a need for rigorous comparison studies between online environments structured with game-based learning (GBL) and those with the same content but a
traditional design (Mayer, 2015; Daubenfeld & Zenker, 2015). This research study compared the motivation of students enrolled in two similar online courses, one with a traditional learning format and the other with the same content but organized using the principles of game-based learning.

Previous studies have used the Instructional Materials Motivational Survey (IMMS) in reporting positive results for motivation in GBL environments (Papastergiou, 2009; Erhel & Jamet, 2013; Burgers, Eden, van Engelenburg, & Buningh, 2015). Recent efforts have expanded data collection beyond surveys with real-time user data, but there is more work to be done to determine what types of data provide evidence for student motivation (Novak, 2014; Proske, Roscoe, & McNamera, 2014). This study aims to measure motivation by coupling a survey with user data in an online course designed with and without GBL.

LITERATURE REVIEW

Game-Based Learning

The term GBL has broadly been described as the use of game play in educational contexts (Silva, Macedo, Teixeira, Lanzer, & Graziani, 2017). This includes the use of digital games, virtual environments, board games, and entire curriculum. For this research study, the authors designed an entire online course as a game, including levels, rewards, and thematic aesthetics. The resulting course was structured like a game with increasing challenge over time and iterative cycles of assessment and feedback. This type of GBL design has gained popularity in the research literature as a method to increase student engagement and achievement. For example, the GBL curriculum Zombie-based Learning used a rich geographical narrative and a series of smaller goals to help middle school students learn geography while surviving a zombie apocalypse (Hunter, 2014). In contrast, Lee Sheldon used role playing and the leveling of content as a core strategy in a higher education course (2011). Designing curriculum as a complete gamified experience has shown to improve student outcomes, although specific design strategies and structures were met with varied success (Jackson, 2009; Daubenfeld & Zenker, 2014; Aguilar, Holman, & Fishman, 2015).

For this study, we gamified a personal finance course, an area that may be uniquely promising for GBL. Personal finance instruction is goal oriented from the start in that setting financial goals establishes the individual learning plan. Game attributes that emphasize goal attainment have the potential to reinforce desirable outcomes related to building financial capability. This approach was selected as there is evidence to suggest that the use of game-based learning strategies, including simulations (Mandell & Klein, 2007), are more effective than formal courses in building financial knowledge (Ostrow, 2014).

Motivational Theory

The MVP Model of motivational design combines theories of motivation into a process-oriented system in alignment with instructional design. The preliminary work in this model has been validated and widely used over the past 30 years (Keller, 2008), including the associated IMMS. The model and survey have been used in the evaluation of higher education courses (Chang & Chen, 2015; Alajab & Hussain, 2015; Di Serio, Ibáñez, & Kloos, 2013) and in GBL environments (Novak, Johnson, Tenenbaum, & Shute, 2016; Hamzah et al., 2015; Kankedo, Saito, Nohara, Kudo, & Yamada, 2015; Proske, Roscoe, & McNamara, 2014).

The four dimensions of motivation in this model include attention, relevance, confidence and satisfaction, the first three belonging to the effort category. This includes how learners “curiosity (‘attention’) and motives, or values (‘relevance’), combined with his or her expectancy for success (‘confidence’) will determine which goals have the highest saliency and will therefore lead to purposeful effort to accomplish the goal” (Keller, 2008, p.82). The model was expanded to include
Understanding Computational Thinking before Programming: Developing Guidelines for the Design of Games to Learn Introductory Programming through Game-Play
Cagin Kazimoglu, Mary Kiernan, Liz Bacon and Lachlan MacKinnon (2011). International Journal of Game-Based Learning (pp. 30-52).
www.igi-global.com/article/understanding-computational-thinking-before-programming/56313?camid=4v1a

Online Interaction Styles: Adapting to Active Interaction Styles
www.igi-global.com/chapter/online-interaction-styles/38350?camid=4v1a