Designing Digital Badges for Educational Games: 
The Impact of Badge Type on Student Motivation and Learning

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ABSTRACT

Findings from two studies on the design of digital badges for a middle school geometry game and their impact on motivational and cognitive learning outcomes are reported. Study 1 compared the effect of badges in the game to a group with no badges. Badges did not increase posttest performance for all. Learners with high situational interest performed better with badges, learners with low situational interest performed worse with badges. Study 2 compared mastery goal orientation badges with performance goal orientation badges. The interaction of condition and situational interest from Study 1 was replicated. Furthermore, students receiving performance badges performed better on the posttest than students in the mastery badges condition; the no-badges condition was not different from either of the other conditions. Results suggest badges do not always help in educational video games: Types of badges interact with students’ interest and motivation to affect learning outcomes.

KEYWORDS
Achievement, Badges, Game-Based Learning, Goal Orientation, Incentive Systems, Motivation, Situational Interest

INTRODUCTION

How do badges affect motivational and cognitive learning outcomes in digital games for learning? Digital badges are visual indicators of accomplishments or skills within a game that are earned during game play and can be collected and displayed to other players. Badges are of interest to both game designers and education practitioners as digital games are increasingly accepted as educational environments (Honey & Hilton, 2011), and both male and female students are spending a significant number of hours per week playing video games (Homer, et al., 2012). Because there are a number of perceived benefits of games (Plass, Homer, & Kinzer, 2015), educators are integrating games into their curricula at schools and universities, and researchers are studying their design and effectiveness (Mayer, 2016; Plass et al., 2013; Plass, Homer, Kinzer, 2016; Tobias & Fletcher, 2007, 2012).

One game design feature, the incentive system, is receiving a great deal of interest, especially since a game’s ability to motivate learners has been linked to the type of incentives they provide. Digital badges are one such incentive type, and a growing number of educational games and other learning environments are implementing badges with various functions. However, despite this

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growing interest in digital badges, there is a lack of empirical research to guide the design and use of badges within learning contexts. Some communities are focusing on the use of badges as credentials or assessments; advocating for the widespread implementation of badges as a superior alternative to grades for recognizing and evaluating student performance (Digital Media and Learning Research Hub, 2014). Other communities (e.g. Edmodo.com, Khan Academy) are focusing on the use of badges as an added incentive system to motivate participation and foster the learner’s interest. Despite the variety of different conceptualizations around the roles and merits of badges, there is agreement that the way badges are designed, and how they are interpreted by the learner, will ultimately determine the effects they will have on users. Dan Hickey refers to this as the purpose versus function of badges (Hickey, 2012) and describes badge functions such as recognizing learning, assessing learning, motivating learning, and evaluating learning. When designing badge systems, designers make conscious decisions about the badge function, and about which types of accomplishments or skills to recognize via badges. These choices can affect the function of those badges, relative to the structure of the learning environment and the player’s own personal goal orientation, individual interest, and situational interest.

The use of digital badges as vehicles for assessment or credentialing in a learning context is relatively new, and only a small body of research exists that investigates the impact of badges on learning processes and outcomes (e.g., Abramovich et al., 2011). In fact, because of calls for the widespread implementation of badges into various learning contexts (Digital Media and Learning Research Hub, 2014), some researchers have voiced concerns that there is not sufficient empirical evidence for badges’ motivational effects, including empirically-based insights into how badges should be designed to achieve their intended function (Biles and Plass, 2016). Some of the concerns stem from the fact that motivation research has identified conditions when rewards reduce learners’ motivation, such as the over-justification effect. This effect suggests that external rewards can lead to a decline in intrinsic motivation (Deci & Ryan, 2001). In the context of badges, over-justification might cause students to become more focused on winning new badges than on the completion of the learning tasks.

Our goal is to address the lack of research exploring the relationship between badge functions and player motivations. In our past research we combined insights from achievement goal theory, existing badge frameworks, and research data and created a framework to classify the different functions of badges within learning games, which we call the Educational Badge Typology (EBT; Biles & Plass, 2016). The two studies reported here investigate the effect of different badge designs, each of which serves a specific function outlined by the EBT framework, on motivational and cognitive outcomes. Study 1 examines the cognitive and motivational effects of introducing badges in the learning task category of the EBT to an educational game environment by comparing a game with badges to a game without badges. Study 2 investigates whether the function of digital badges affects those same cognitive and motivational outcomes by comparing games with badges that have a mastery focus to games with badges that have a performance focus.

LITERATURE REVIEW

Digital Badges
Non-digital badges have historically been used in a variety of ways, from identifying group membership via Roman army insignia to denoting skill-acquisition and mastery via Boy Scout/Girl Scout merit badges. With the onset of the Web came the creation of digital badges; visual artifacts that played similar roles of being indicators of authority, expertise, experience, and identity (Halavais, 2011). These early badges were used in online social media platforms such as MySpace to indicate personal interests and characterize virtual personas. Other collaborative social platforms such as Wikipedia, Foursquare, and StackOverflow used badges to indicate types of participation or levels of contribution.
Digital Game based Learning for Undergraduate Calculus Education: Immersion, Calculation, and Conceptual Understanding
www.igi-global.com/article/digital-game-based-learning-for-undergraduate-calculus-education/144278?camid=4v1a

The Fall of the Fourth Wall: Designing and Evaluating Interactive Spectator Experiences
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