Gamification and Badges

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Educators are often looking for innovative ways to engage and motivate students and improve learning outcomes. Looking outside the classroom, video games stand out as an increasingly popular activity that motivate players to continue engaging, work hard, and solve problems. Thus, educators are looking more closely at games to examine why they are so engaging, and the concept of gamification, or using game design elements in an educational context, is the result.

One method of gamification is the use of digital badges (Gibson, Ostashewski, Flintoff, Gran, & Knight, 2015). Digital badges can be used in a variety of ways. One emerging method involves learners earning badges that can potentially be used as a credential or proof of achievement somewhere outside of the original course or learning experience (Gibson et al., 2015).

Another example of digital badges is having students earn badges by completing certain tasks or fulfilling certain criteria in a course. These types of badges present a way to gamify a course without requiring the development of complex game elements, but there are things to consider when implementing badges in a course. Since digital badges are a relatively new learning technology, there is still much research to be done on how digital badges affect learning. This paper will review the current literature on gamification with a focus on the use of digital badges in the context of a specific course or learning experience. The first section will discuss gamification in general terms. The second section will focus on digital badges as a gamification technique. The third section will discuss motivation in the context of extrinsic rewards.

**Why Gamification?**

According to Deterding, Dixon, Khaled and Nacke, the term “gamification” has been around since 2008, but the term’s meaning has been debated (2011). Deterding et al. (2011) propose this concise definition: “the use of game design elements in non-game contexts” (p. 2). They specify that gamification deals with games, not play (as defined by Caillois (2006). Deterding et al. also mention gamefulness, which refers to the qualities of gaming; and gameful design, which is intentionally including game elements in design. The authors define game elements as those attributes that are “characteristic” of games. They also present a framework for looking at game design elements, and posit that “gamified applications merely use several design elements from games” (Deterding et al., 2011, p. 4), in contrast to serious games, which have all elements present. Deterding et al. do not limit gamification to digital technology (2011). Dominguez et al. (2012) use a similar but narrower definition, specifying that “gamification is based on technology” (p. 381). The definition presented by Deterding et al. is used frequently in recent literature (see Hanus and Fox, 2015; Hakulinen, Auvinen and Korhonen, 2015; de-Marcos, Domínguez, Saenz-de-Navarrete, & Pagés, 2014).

Why is gamification desirable in education? Players engaged in a game are typically playing because they enjoy it (Sweetser & Wyeth, 2005), but they may also be doing the “better hard work” described by McGonigal (2011) or even learning. Lee and Hammer (2011) suggest that school is, by default, a gamified experience – grades are a reward system, and moving to the next grade is leveling up. However, students are clearly not as engaged in their learning environments as they are in video games. Many researchers have examined different aspects of games to see how they could inform the design of learning interactions.

For example, Dickey (2005) examined how the strategies of point of view, narrative and interactive design in video games could promote engaged learning through instructional design. Dickey looked at how the strategies of point of view, narrative and interactive design can promote engaged learning through instructional design. The player point of view in video games has evolved from a basic two-dimensional view to a first person POV where the player is immersed in the environment. Dickey compared this engaged, first person POV to environments that are learner centered (such as problem-based learning and project-based learning) and suggested that as the player POV continues to evolve in game play, educators should look to the underlying design principles to inform the design of learning experiences. Narrative is another game aspect that has potential for instructional design. The challenge in game play is building a rich narrative while also allowing the player the freedom to change the story through her choices and actions. Dickey suggests spatial narrative as a possible way to incorporate the rich narrative present in game design. Additionally, the complex nature of the settings, roles and feedback in game design could inform the instructional design of more fully realized interactions in learning environments.

Moreno-Ger, Burgess and Torrente (2009) looked at adaptation, assessment and collaborative learning that occur in commercial games, and how they could be applied in eLearning. In commercial video games, adaptation is almost always present. The game often changes based on how well a player is doing (such as in MarioKart, where racers at the back of the pack get better bonuses). Assessment and feedback are another essential part of games that are also important in learning. In video games, feedback is happening constantly as a part of the world the player is in. Moreno-Ger et al. noted that game players also “posit theories” about the game world in games where they can move about and play freely. While this creates a super engaged player, in education, there is often a correct or incorrect answer or way of interpreting the content. Thus, there must also be a mechanism to guide students if they posit incorrect theories about the content. The communities that organically form around some video games are ideal models for communities of practice in learning, as is the collaborative playing that some players do when they are immersed in a game world.

Educators want their students to be intensely engaged and motivated, like someone who is playing their favorite video game. If specific gaming elements such as the ones mentioned contribute to the engagement and motivation of a video game player, perhaps applying these elements to a learning activity or course could create similar engagement and motivation in a student. This is the promise of gamification in education, and digital badges are one potential way to “gamify” a learning experience.

**Defining Badges**

Digital badges have existed in video games for a long time. In commercial video games, badges often appear in the form of achievements. In some games and gaming systems, achievements are automatically displayed where other players can see them. The achievement reward itself and the social aspect of sharing the badge are both a common part of commercial video games (Abramovich, Schunn & Higashi, 2013). In other games, the badges or achievements may also grant the player additional powers or access to additional levels.

Digital badges in education are being used in a similar fashion. Students will complete certain tasks or fulfill certain criteria, and earn a digital badge. The badge may be displayed to just the student who earned it, or the badge may be be displayed on a leaderboard for other students to see as well. However, digital badges “[may] not necessarily have practical value to the users” (Hakulinen, Auvinen & Korhonen, 2015). The badge does provide feedback that the student has been successful in some way. Badges can also be given for a number of different things, such as participation, performance, or completion in a timely fashion.

Abramovich, Schunn and Higashi (2013) looked at badges and motivation in middle school students, using an intelligent tutoring system. In this study, badges were divided into two main categories: skill and participatory. The authors were interested in how different types of badges might motivate students in different ways, and if students with different abilities would be motivated differently (Abramovich et al., 2013, p. 223). Although their overall findings showed improvements due to the badges, there were differences in the behaviors of low-performing students and high-performing students. For example, in low-performing students, “a higher desire to outperform other students correlate[d] with earning more badges” (p.229) and this was not the case with the high-performing students. With high-performing students, the more skill badges they earned, the more they expected to do well. They found that with students who may not do well in the content area, participation badges could potentially have a negative motivational effect. Based on their study, the authors recommended increasing skill badges and decreasing participation badges.

Hakulinen et al. (2015) did a study on digital badges in a college level computer science course. Like Abramovich et al. (2013), they were interested in how the achievement badges would affect student behavior. The study had a control group that could not earn badges, and a treatment group that could earn badges. The available badges fell into one of three categories: time management, carefulness, or learning. The students could see their own results, but a leaderboard was not used in this study. The results showed both positive and negative effects on student behavior. They found that some badges may have motivated some students to spend more time on their learning activities, and to pay more careful attention to their work (Hakulinen et al, 2015). Additionally, the treatment group achieved badges that were more difficult to earn more frequently. The authors posit that the “additional challenge provided by harder badges is found motivating and thus worth pursuing” (p. 26). However, the badges also showed possible negative effects. For example, a time management badge that rewarded finishing quickly might have resulted in less careful work by students (p. 27). Some students also disliked the criteria for certain badges. Hakulinen et al. recommend further research to learn how to balance the positive and negative effects of badges.

Hanus and Fox (2015) conducted a longitudinal study on gamification, using badges and a leaderboard with the students. In the study, there were two classes: one with gamified elements, and one with no gamified elements. The gamified class had 22 badges available to earn for various accomplishments, including participation or meeting certain criteria on an assignment, such as no grammar errors in a paper (p. 156). The results of the study showed that the badges and the leaderboard may not improve learning, and in fact, may have a detrimental effect on student learning. As the authors hypothesized, students in the gamified course had lower motivation and were less satisfied than students in the non-gamified course.

All three of these studies confirmed Deci, Koestner and Ryan’s 2001 work on extrinsic rewards and their effect on intrinsic motivation, which is discussed in the next section.

**Extrinsic Rewards and Motivation**

In 2001, Deci, Koestner and Ryan published a meta-analysis on the effect of extrinsic rewards on intrinsic motivation in education. This meta-analysis is relevant because digital badges, in their most common form, are an extrinsic reward. Deci et al. used the framework of cognitive evaluation theory, or CET, to examine extrinsic rewards. According to CET, there are two important aspects to rewards: the informational aspect, which can enhance intrinsic motivation, and the controlling aspect, which can decrease intrinsic motivation (Deci et al., 2001). They looked at specific types of extrinsic rewards, including the following types that could apply to digital badges: engagement-contingent rewards, completion-contingent rewards, and performance-contingent rewards.

Engagement-contingent rewards were given for simply participating in a task. The participants did not have to do well or complete the task. This could be compared to a participation badge, as in the study by Abramovich et al. (2013). The meta-analyses by Deci et al. “confirmed that engagement-contingent rewards significantly diminished intrinsic motivation” (2001, p. 10). The results for completion-contingent rewards were the same. Performance-contingent rewards were given for “doing well at a task or performing up to a specified standard” (Deci et al., 2001, p. 11). The analyses of these types of rewards were more complex than the previous two, but the result was the same – reduced intrinsic motivation. The authors recommend a focus on increasing intrinsic motivation rather than using rewards to motivate.

One focus of gamification in education is increasing motivation in students. Games, as described by McGonigal (2011), provide motivation to the player through feedback, and are intrinsically motivating because they are fun. Thus, it is important to note that some research shows that badges may have the potential to decrease intrinsic motivation. Abramovich et al. (2013) noted that the participation badges in their study “had minimal explicit connection to measure of skill.” However, they posited that skill badges might provide intrinsic motivation for learners, providing the “informational aspect” described in CET. Hakulinen et al. (2015) did not tie the badges to course grading in their study, and they believe that associating the badges with grades could “increase the controlling aspect…and possibly have an undermining effect on students’ intrinsic motivation” (p. 27). The results from the study by Hanus and Fox (2015) also support the meta-analyses by Deci et al. (2001). In their study, Hanus and Fox saw that students in the gamified course showed decreased intrinsic motivation.

**Summary**

 While there is much research on why games are effective and engaging, there is still further research to be done on how to effectively transfer these effects to non-game contexts, especially in the area of badges. The studies discussed above shows that digital badges on their own may not be sufficient to gamify a course in a way that motivates students. There is some evidence that the criteria for earning badges, the types of learners in the course, and students’ prior knowledge may all affect how badges work to motivate students. Additional research that focuses on each of these specific areas while implementing badges may be useful in finding best practices for badges. Also, finding a system to offer badges that increase the informational aspect of the reward, rather than the controlling aspect, thus potentially increasing intrinsic motivation, may improve success. This may also include reducing the use of participation badges, as suggested by Abramovich et al. (2013) and increasing the use of skill badges.

 Further research is also needed on badges when they are included in a larger, more complex game, rather than the only gamified aspect of the course. While one appeal of digital badges is that they can be implemented without the development of additional game elements, they may prove more effective in the context of other game elements, such as a story that also allows user choice (Dickey, 2005). Additionally, badges are often used as a required element in the course, and McGonigal (2011) names voluntary participation as one of the defining traits of a game. Hakulinen et al. (2015) suggest further research on how mandatory or voluntary participation affect student learning in a gamified course.

 Digital badges are potentially one engaging aspect of a gamified learning environment. However, the type of badge and the type of learners in the course are all important considerations before implementing badges, and additional research is needed to formulate recommendations and best practices for digital badges in education.

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