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BADGES AND GAMIFICATION IN ELEARNING: EFFECTS ON ACHIEVEMENT AND ENGAGEMENT

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ABSTRACT

The use of digital badges and gamification strategies to increase student engagement and achievement in eLearning environments is investigated. Badges serve as visual representations of achievement, and they can be used as achievement identifiers in eLearning environments. Gamification strategies include the use of typical game playing elements (points, leaderboards, etc.) in non-game activities. After an extensive literature review, the authors provide data from a recent pilot study of the implementation of digital badges and gamification strategies in two eLearning courses composed of 52 students offered in the spring of 2016 at a university in the Southeastern United States. Student engagement, participation, and achievement was investigated, with results showing that the use of the strategies employed did increase engagement in the courses as well as achievement. Results from the pilot also indicate a need for further investigation to compare with courses that do not incorporate these strategies.

Keywords

Badges, gamification, eLearning, engagement, achievement, motivation

INTRODUCTION

When you define something you place a value on it, one that sets that particular object ahead of others. For the purpose of our research, we are defining a badge as an emblem or token that marks distinction, a title, or a level of achievement. Badges are becoming increasingly popular in online communities, and they can oftentimes be used as a credentialing system or be able to provide summaries of the skills and achievements of recipients (Anderson, Huttenlocher, Kleinberg, & Leskovec, 2013). While badges have been around for ages in many different forms (i.e. Boys Scout Badges) they are just now coming in to their own as an achievement identifier in eLearning environments (Halavais, 2012). They may also be seen as intrinsic motivators for those wishing to reach new levels of personal accomplishment.

Digital badges are being utilized by social media sites, educational sites, and even health activity trackers to reward the user for their achievements and involvement in an activity. They can help motivate a user and promote an atmosphere of valued learning (Anderson, Huttenlocher, Kleinberg, & Leskovec, 2013). Badges can be a way for the user to showcase their skills and credentials earned, while also encouraging the user to gain more knowledge as they advance forward in the endeavor. The purpose of this research will be to answer the following research question: Can the use of digital badges and gamification strategies increase engagement and achievement of students in online and hybrid courses?

LITERATURE REVIEW

In recent years, gamification and the use of digital badges to show distinction have been used in a variety of ways, such as in e-commerce settings, health informatics, work place settings, and especially in educational formats. In Faiella and Ricciardi's (2015) review of gamification and learning, the authors refer to the term "gamification" as one that "is used in relation to many issues; the need to arouse and maintain students' interest in learning- with the aim of involving users and encouraging them to achieve more ambitious goals". Halavais (2012) states that a digital badge is "a metaphor that allows the user to identify something as a marker of skill, experience or merit". Motivation, a key factor behind the completion of a badge, is what drives a person to complete something, whether it be intrinsically or extrinsically. Badges could serve as both extrinsic and intrinsic motivators, as Li., Huang, & Cavusoglu (2012) note that "badges serving as extrinsic motivations could be internalized by individuals to enhance their intrinsic motivations such as community identity and desire of self-actualization".

While some view gamification and the use of badges as powerful motivating factors for students, there are some who disagree with this idea. Broer (2014) reported that "most reviewed studies do not actually report net-positive results and discuss reasons

as to why gamification seemingly fails to deliver. One major potential reason identified is the variance in motivations to play games". This variance in motivation can affect all aspects of learning, academically as well as personally. When a person is lacking in motivation they can have a deficiency in other capacities of their life like work, school, and relationships, all of which can have either a positive, or negative impact on their daily performance in these areas. Gamification provides an element of drive that motivates a person to do better, thereby implementing a factor of success into their lives that will hopefully make them aware of their intrinsic abilities to succeed in something that will bring about an encouraging outcome.

In a study of the literature on what motivates a student to participate in a badge oriented course, two key themes emerged; motivation and ability. Muntean and Kogălniceanu (2011) suggest that "in order to change or trigger a behavior students need to be motivated and at the same time have the ability to solve challenges". In his behavioral model, Fogg (2009) attests that "motivation alone— no matter how high— may not get people to perform a behavior if they don't have the ability". In order for this change or trigger to be employed students need to be motivated, therefore the ability and motivation factors are directly reciprocal of the trigger factor meaning that all three rely on each other for a goal to be achieved.

Badges and gamification techniques are also being used today in much wider applications when it comes to post-secondary education. Leaderboards can be incorporated into a course along with a completion badge to motivate students towards a better outcome and raise their adaptation levels to the course. As Lister (2015) stated "Today's students are technology savvy and expect to be engaged. Incorporating gamification elements into post-secondary environments can motivate students and support student achievement in post-secondary environments". This supports a need for methods and technology in post-secondary online courses aimed towards engaging the learner. In this prospect, Lister goes on to suggests that it is important to "create a narrative that is appropriate and engaging for the learner, as well as tailored to the course content. Course instructors and instructional designers must carefully consider how to best implement gamified elements into coursework to ensure enhanced engagement and motivation".

When properly implemented, gamification can produce positive outcomes and have real benefits to education. In their own literature review of 24 empirical studies on gamification, Hamari, Koivisto, and Sarsa (2014) posited that the "studies in education/learning contexts considered the learning outcomes of gamification as mostly positive, for example, in terms of increased motivation and engagement in the learning tasks as well as enjoyment over them". Yet this doesn't mean that gamification and badges for completing tasks in online courses is for everyone. Courses must be designed with the user in mind and be made to enhance the user's ability to complete them. As Lister (2015) noted "course instructors and instructional designers ought to consider the profiles of the learners and ensure that steps are taken to mitigate any negative impacts of gamification on learners who do not find gamification beneficial".

Based upon the literature reviewed, the researchers for this study theorized that in order for gamification and badges to be successful in an eLearning environment, the learner must first be motivated (intrinsically or extrinsically), then a trigger must be implemented so that an action can be applied according to the user's ability, in order to achieve a positive result. The implementation of a badging tool in the university's Learning Management System enabled the researchers to examine this theory in an actual eLearning environment.

METHODOLOGY

A pilot case study was conducted at a state university in the Southeastern United States in the spring of 2016. Participants were students in two eLearning classes (n=52; Online Section=26, Hybrid Section=26) who were given the chance to earn digital badges in different sections of an information technology course covering the fundamentals of digital media. Both sections of the courses were taught by the same instructor who is also one of the researchers in this study. While each section was delivered via different methodologies (with one delivered completely online and the other as a hybrid course mixing online and face2face components), the learning outcomes, curriculum, and timeline for each offering were identical. Each of the badges represented significant milestones for the course in projects related to the course content. Badges were only awarded for project-based assignments, not for assignments such as quizzes or normal discussion posts.

Figure 1. Examples of Project-Based Badges

A total of six "Level Up!" badge opportunities were provided with each counting as an additional point added to the student's final grade (for a possible additional six points). The six "Level Ups!" theoretically would allow a student to move from a lower grade to the next higher grade (ex. B to an A, or C to a B).

Figure 2. Examples of Level Up! Badges

While all of the "Level Ups" were optional and voluntary, the other badges incorporated into the course were additional "rewards" for obtaining an excellent grade (80% or above) on one of the seminal projects for the course. By awarding both optional and non-optional badges, all students in the courses were able to earn badges and take part in the "gamification" of the course. The gamification strategies employed included the use of a "leaderboard" which identified the top badge earners in each section, as well as the addition of the "Level Up!" badges that would allow students to earn extra credit on their final grade for the course.. A leaderboard was posted on the course homepage that would show the top badge earners for a given week.

Figure 3. Leaderboard Example

Engagement and achievement were measured based around the end results of the respective courses. Participation in a voluntary Level Up was identified as a factor that represented increased engagement in the course. Increased achievement was gauged by the participants being awarded a higher final grade for the course had they not taken part in the Level Up opportunities. What follows are the results from this pilot.

RESULTS

The following table shows the end of course grade distributions of the 52 student participants who completed the courses.

Final Grade	Online	Hybrid
A	15	16
B	5	6
C	5	2
D	0	1
F	1	1

Table 1. End of Course Grade Distributions

These final grades show that the vast majority of students were extremely successful in the courses, with 94% passing the courses with an A, B, or C. Yet what impact did participation and increased engagement in the courses via the badging

opportunities contribute to these success rates? Results from the online section of the course show that 73% of the students participated in at least one Level Up with all students earning at least one project-based badge. The hybrid section of the course showed a lower Level Up participation at 62%, but this section also showed that all students earned at least one project-based badge.

The following table illustrates the number of Level Ups successfully completed in each section.

Level Up!	Online	Hybrid
1	13	16
2	13	11
3	3	3
4	1	2
5	5	2
6	5	3

Table 2. Student Level Up Participation

These data show that at least one student completed at least one Level Up in each of the sections, yet it should be noted that there was only one student in the hybrid section who completed all six Level Ups. The results also may indicate that there may have been a novelty effect with the first Level Ups early in the course, with the additional Level Up participation decreasing as the Level Ups were released over the 16 weeks of the semester. The rationale for not having all Level Ups released at one time was due to the fact that the Level Ups were advanced enrichment activities based around content of the course being taught at a given time. The instructor sought to make the Level Ups relevant to the curriculum being covered at the same time in the course. It should also be noted that there was no set due date for the Level Ups (as there were with the project-based badge opportunities) and they did not have to be completed in order. Students could submit any Level Up assignment up until the very last day of the course.

The following table indicates the impact that successful participation in a Level Up had on the students' final grades.

Grade	Online	Hybrid
No Change	17	17
B to A	4	6
C to B	3	2
D to C	2	0
F to D	0	1

Table 3. Level Up Impact on Final Grade

These data show that while the majority of students in both sections (65%) had no change in their final grade due to Level Up participation, 35% of the students did in fact increase their achievement in the course, with achievement being defined by their end of course grade. It is interesting to note that the majority of the students with a grade change (19%) moved from a B to an A, yet two students were able to increase a D to a C and one student managed to earn a passing grade of D from an F. It is also interesting to note that the number of students who successfully "upped" their grade was the same for both groups (n=9).

CONCLUSION

The results from this pilot study show that participation in the gamification strategy of Level Up badges did increase student engagement which in part impacted achievement in the two courses that implemented the strategies. Further research should be conducted to determine the impact of the project-based badges on student achievement and satisfaction. Further research should also be conducted to compare these results to course sections with the same curriculum that did not implement the gamification strategies. While the majority of the students who participated in the Level Ups did not have a change in their final grade, further research could determine an achievement factor rate based on participation in the gamification strategies. Further research should also be conducted to determine if the "novelty effect" impacts participation in the implemented strategies, from the perspective of the students and the instructor.

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