Game dynamics in the classroom: Badges to improve student engagement and learning in large lecture courses

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Summary
The goal of this project is to create and evaluate a badging system for learning in order to increase college student academic engagement and improve class attendance and academic performance. We hypothesize that we can improve college student academic outcomes by combining Location Based Services (LBS) with a badging system employing game dynamics and integrating it in an educationally-relevant way in a large-lecture course.

Introduction
Student Engagement
In 1984, Alexander Astin proposed a developmental theory for college students that focused on the concept of involvement, which he later renamed engagement. Astin defined engagement as “the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, p. 297). The construct of engagement has since been extensively researched. Improvement in grades and persistence has been noted across various populations, including minority students, first generation students, and students not adequately prepared for college academic work with increased engagement (Kuh, et al., 2008; Pascarella & Terenzini, 2005).

Social media and student engagement
Recent studies have found relationships between time spent on social media and student engagement as described by Astin (1984) and measured through single survey items. Studies by Heiberger and Harper (2008) and HERI (2007) found a positive correlation between social networking website use and single-item measures of college student engagement. A more recent and extensive study conducted by the principal investigator (Junco, 2012a) found that while time spent on Facebook was negatively related to student engagement, certain Facebook activities (such as creating and RSVP’ing to events and commenting on friends’ content) were more strongly and positively related to engagement. In a related study, Junco (2012b) found that certain Facebook activities were more strongly and positively related to overall GPA than time spent on Facebook. While these studies were cross-sectional and correlational, Junco, Heiberger, and Loken (2011) used a controlled experimental design and found that integrating Twitter in educationally-relevant ways increased student engagement and academic performance. Overall, these results suggest that there are ways social media can be used to maximize the desired outcomes of a college education.

Location-based badges for learning
Location-based services (LBS) have the unique aspects of being tied to space and place. Their use as part of an educational intervention should thus be tied to increases in attendance and engagement (Gordon & de Souza e Silva, 2011). Moreover, research shows that adding a game layer to activities increases motivation to perform those
activities (Burguillo, 2010; Liu & Chu, 2010). We therefore hypothesize that we can improve student academic outcomes by combining LBS with a badging system employing game dynamics and integrating it in an educationally-relevant way in a large-lecture course.

**Methods**

*Badge development*

We have partnered with SCVNGR to develop a badging system for learning tailored for use in large-lecture courses. We will use SCVNGR’s existing mobile applications for iPhone and Android phones. Students will earn points by completing academic-related challenges on SCVNGR.

*Research design*

Before the semester begins, university students registered for a large-lecture introductory course will be randomly assigned to either a control section or an experimental section. Both the control and experimental sections will be taught by the same instructor and will follow the same schedule in the presentation of course material. Each section will contain at least 200 students for a total of 400 participants. The Institutional Review Board for the Protection of Human Subjects will approve research procedures.

*Experimental Section*

Students in the experimental section will use their Android or iOS devices to engage in academic challenges in order to earn badges. Students will check in to the classroom after indicated class sessions. Once they check in, they will be presented with a challenge that involves answering five questions about that day’s lecture, developed in consultation with the course instructor. Students will receive a point for each question they answer correctly. They will also receive points for checking in to the class location, posting pictures of their notes, and posting questions about the day’s lecture. Additionally, students will receive points towards badges by participating in relevant challenges outside of class, including “social check-ins” with a study group, visiting a professor/TA’s office or supplementary instruction session, or checking into the tutoring center.

When a student accumulates a pre-determined amount of points, she or he will receive a badge. Students may earn one badge for each week of the course. At the end of the semester, students will receive course extra credit based on the number of badges they have earned.

*Control Section*

Students in the control section will have the opportunity to answer the same questions as the experimental group; however, these questions will be presented as quizzes using TurningTechnologies ResponseWare. ResponseWare allows students to submit answers by using either their mobile phones or their laptop computers. The quizzes will include the same content and be administered at the same time as the experimental group. Control group students will also be able to complete the other
challenges, but they will be presented as extra credit opportunities accompanied by manual tracking methods and a traditional scoring rubric equivalent to the badge system.

**Outcomes**

We will evaluate differences in student engagement, attendance, and academic performance between the experimental group and the control group. Researchers will obtain student permission to collect SAT scores and high school GPA in order to ensure that the experimental and control groups were equivalent on pre-existing academic ability. Student attendance will be recorded for every class session. At the beginning and end of the semester, students will take a 19-item engagement scale based on the NSSE (Junco, 2012a; Kuh, 2002). Attendance, course grade, and changes in engagement scale score will be compared between the two groups. Focus groups will be conducted with students from both sections. We expect to publish at least two peer-reviewed papers from the study. Additionally, we will produce an easy-to-adopt badge system, provide faculty development through the associated workshop and an online video, and use social media to disseminate educationally-relevant best practices for using badges in large-lecture classrooms.