Does the Use of Digital Badges Affect the Frequency of Online Discussion Forum Participation in a Blended-Learning Class?

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Discussion forums can be a powerful tool with a positive impact on student outcomes in online and blended-learning classes. However, the benefits of online discussions are dependent upon the level of student participation. Student participation in online discussions can often be difficult to promote and many students participate only to the extent of the minimum requirement. This study sought to determine if the use of achievement badges, an online reward similar in appearance to a medal used as a gamification element, may have an effect on the frequency and volume of student participation in online discussions. The participants in this study were 21 students, divided into two classes of nine and twelve each, from all levels at a university in South Korea. Students engaged in mandatory, weekly, online discussions through Blackboard. The discussion requirements included a minimum number of posts per student. The control class received no extra reward or acknowledgement for posting beyond the minimum requirement, whereas the experimental class received achievement badges according to the number of posts they made beyond the minimum. After three weeks, the total number of discussion forum posts in each class and the number of posts per user were examined and compared. The results seem to suggest that little to no relationship exists between receiving achievement badges and the number of posts made nor the number of users per week. Students who received achievement badges made only 1.37% more posts than those who did not. As no test of significance was performed, the results cannot be generalized.

Keywords: discussion forum, achievements, badges, gamification

I. INTRODUCTION

Statement of the Problem

   The purpose of this study is to determine if the use of achievement badges has an effect on the frequency and volume of online discussion forum participation in blended-learning classes.

Significance of the problem

Discussion forums can positively impact student outcomes in online and blended-learning classes. However, the benefits of online discussions are dependent on the level of student participation. Student participation in online discussions can often be difficult to promote and many students participate only as much as the required minimum to earn full points.

Rationale

Online and blended-learning courses are becoming increasingly commonplace. Of the tools available in most learning management systems, discussion forums are often utilized as a digital substitute for interpersonal interaction between students and instructor as well as students and other students. Active participation in these discussion forums can often be challenging to foster. This action research study compared the participation of two groups of students in online forums to investigate if there exists any relationship between the use of digital achievement badges and the number of discussion posts and participants per week.

Definitions
- **Achievement badge:** a small, online reward similar in appearance to medals, trophies, and pins that are awarded for task completion or skill mastery
- **Blackboard:** a learning management system that consists of a virtual learning environment and a course management system
- **Blended-learning:** a mixture of traditional in-class and online learning
- **Discussion forum:** an asynchronous, online discussion organization format that allows parallel discussions in a threaded manner
- **Post:** a written contribution to an online discussion forum in the form of a new thread or a reply to an existing thread
- **Thread:** a sequential chain of written, related contributions displayed in the order received

Hypotheses

Students who receive achievement badges will participate with greater frequency and volume in online discussions than students who do not.

(Null hypotheses): Students who receive achievement badges will not participate with greater frequency and volume in online discussions than students who do not.

Research questions

What effect, if any, does the use of achievement badges have on the frequency of student participation in online discussions?

Can non-scored extrinsic motivators encourage increased participation in online discussions beyond the required minimum?

School and Community Resources

The researcher is a full-time instructor at a private university in South Korea. The participants in this study were two classes of students ranging between their first and fourth year of university education in a blended-learning elective course of differing topics. The researcher used the learning management system Blackboard and its discussion forum and achievement tools. Blackboard records relevant discussion forum metrics such as number of posts and number of participants per forum.

II. RELATED LITERATURE

Introduction

Online and blended-learning courses have become commonplace at higher education institutions. One of the many online tools available to these courses is the discussion forum, a type of asynchronous computer-mediated communication. Discussion forums, by their nature, require active participation. Digital badges, which are "akin to the physical scout badges that scouts earn" (Shields & Chugh, 2017, p. 1817) can be used as a gamification element to encourage participation.

Importance of Interpersonal Interaction in Blended and Online Courses

Discussion forums are a powerful tool that can allow interpersonal interaction in online and blended learning courses. In fact, Quality Matters, the Middle States guidelines, and nearly all other online quality frameworks emphasize interpersonal communication and collaboration (Jaggars & Xu, 2016). Khalif, Nadiruzzaman, and Kwon (2017) found that asynchronous communication in an online environment supports learning and knowledge building (p. 166).

Participation in online discussion has been found to correlate significantly with student grades and learning outcomes. Zacharis (2015) identified that only four variables predicted 52% of the variance found in final student grades. Of these four variables, "reading and posting messages on a forum board, email, and chat was found to be significantly correlated with course success, explaining 37.6% of the variation in the final student grade" (p. 51) and that this "highlights the importance of engagement with peers and instructors" (p. 52).

In a study by Jaggars and Xu, they determined that "the quality of interpersonal interaction within a course relates positively and significantly to student grades" (2016, p. 270). This position is further corroborated in research conducted by Green, Farchione, Huges and Chan (2014) that finds posting on discussion forums contributed to improved learning outcomes and higher marks (p. 75), and again by Alzahrani's research in 2017 that "shows that significant and positive direction relationships were found between student participation in online discussion forums and their final course marks" (p. 170) Alzahrani also found that participating in discussion forums may allow students to work collaboratively and engage in active learning (2017, p. 173). Additionally, Alzahrani notes that there was no statistically significant connection between student participation and their

prior GPA (2017, p. 170) which seems to imply that higher participation in forums is not merely a by-product of high-achieving students.

Investigating what students themselves find most effective in an online communication course, Jacobi (2017) determined that students overwhelmingly find "online discussion more effective than those in traditional classrooms". Specifically, 67% of the students surveyed thought online discussion more effective than live and 18.5% found them at least as effective as live discussions (p. 10).

Gamification, Digital Badges, and Motivation

The literature regarding the use of digital badges in online courses and discussion forums is divided. One study has found that interest improves and that there is a decrease in counter-productive motivations in a system using badges (Abramovich, Schunn, & Higashi, 2013, p. 228). While research by Gibson, Ostashewski, Flintoff, Grant, and Knight in 2013 found that earning badges can motivate some students to engage with online material and activities (p. 408).

According to a study performed by Ding and Orey in 2018, "students using gamification elements, including badges, in online discussions posted beyond the minimum requirement" as well as demonstrated "positive effects on behavioral engagement (p. 220). Specifically, these gamified elements showed the most effect on medium achievers, whereas high and low achievers were affected less (p. 220). This same study concluded that "students seemed to spend more time and put additional effort into writing their posts thanks to the motivation of earning valuable badges (p. 221).

Research performed by Chou and He in 2016 specifically aimed at the effectiveness of digital badges on student online contributions, found that awarding badges had a "statistically significant effect on the number of comments and replies", that they engaged students in online activities, made the learning process more enjoyable (p. 1106), and that they were effective in encouraging student interaction irrespective of delivery format (p. 1113).

Their study goes on to provide details of participant attitudes toward a badges reward system in online discussions. According to the study, 75% of respondents agreed that badges promoted them to provide peer comments, 66.7% agreed that badges helped with monitoring their progress and that badges "kept them on the right track", and 50% agreed that the badge system gave them a sense of accomplishment (Chou & He, 2016, p. 1104).

Conversely, Reid, Paster, and Abramovich found that "digital badges are viable as assessment tools but heavily dependent upon individual learner types" (2015, p. 377), and that the effectiveness of badges depends heavily on the motivation of the student (p. 392). In fact, they found that participants showed a statistically significant decline in intrinsic motivation after the first half of the semester, although motivation stabilized after the initial decrease for the remainder of the term (p. 389).

Their study continued to state that "the simple presence of digital badges did not enhance learner motivations. Rather, learners recognized the importance of badges as grade values since they were employed as both completion-contingent and performance-contingent rewards" (p. 392).

Despite these findings, they did find that overall "learners reported having a positive experience with the digital badge framework" although it was dependent on learner performance and that participants who earned many badges rated it more favorably than students who earned few to none (p. 393).

Furthermore, research in gaming personality and game dynamics in online discussions, which sorted participants into one of four gaming personality types, socializer, achiever, explorer, and killer, stated that different gaming personalities enjoy and respond to different motivations and enticements (Tu, Yen, Sujo-Montes, & Roberst, 2015, p. 159). It goes on to posit that achievers "appreciate positive reinforcements in gaining and exploring points, levels, or badges" and "are considered consumers who prefer rewards for their actions; therefore, they will perform activities to be rewarded with points or badges" (p. 160).

While badges might act as a motivation for learners with an achiever personality, the study found that the majority of participants, 64.79%, were of the explorer type and only 21.13% were of the achiever type (p. 166). This may indicate that most learners find their motivation unaffected by the use of badges.

Conclusion

Discussion forums can play a positive and vital role in online and blended-learning courses (Khalif et al., 2017). And, as shown by Zacharis (2015), Jaggars and Xu (2016), and Alzahrani (2017), are significantly correlated with student grades and outcomes. The literature surrounding use of digital badges to drive student motivation and participation in discussion forums is mixed.

Research by Abramovich et al. (2013) and Gibson et al. (2013) state that badges can improve students' interest and engagement with online activities. Chou and He (2016) and Tu et al. (2018) found that badges had a positive effect on the number of posts and comments as well as exceeding minimum requirements. Chou and He (2016) also demonstrate that the majority of students have positive opinions regarding badges and their effects.

On the other hand, Reid et al. (2015) found that the effectiveness of badges is heavily reliant on learner types which is further supported by the findings of Tu et al. (2015). While badges may motivate students with an achiever-type gaming personality, these personalities were a minority of the participants in the study.

III. METHODOLOGY

Settings and Participants

Participants in this study were 21 students from two blended-learning elective courses of 9 and 12 students each at a South Korean university. The content of the elective courses and therefore the topic of the online discussions differed. The

participants included students from all university levels, freshman through senior. The 9 participants from Class A received achievement badges related to online discussion participation and the 12 participants in Class B did not.

Ethics and Consent

Before commencing this research study, participants were informed of their possible involvement verbally and in writing using consent forms in both English and Korean. It was communicated to the participants via both languages that their involvement was completely voluntary and anonymous and emphasized that although participation in the online discussions was a calculated portion of their course score, choosing not to be a part of the study would have no effect on their grade. All consent forms were signed and returned.

Instrumentation

Both classes engaged in weekly, online discussions through Blackboard. Blackboard records the time and date of each student's posts as well as calculating the total number of posts and contributors per forum. The instrumentation in this study consisted of three levels of digital achievement badges, gold, silver, and bronze, awarded based on the number of posts made beyond the minimum as outlined by the discussion requirements.

Procedures

During this study, both classes were given mandatory, weekly, online discussions through Blackboard. The students' participation in the discussion required a minimum of three posts per week to receive full credit.

The control class received no extra reward, incentive, or acknowledgement for posting beyond the minimum number required. Conversely, the experimental class received achievement badges each week related to the number of posts they make in that week's discussion. Students who posted the minimum number of times required received a "bronze" badge, students with one to three posts more than the minimum received a "silver" badge, and students with four or more posts beyond the minimum received a "gold" badge. The achievement badges had no additional effect on their scores. Each student's badges were visible only to themselves and the researcher.

Over the span of three weeks, the total number of discussion forum posts in each class was recorded, particularly the total number of posts and number participants.

Limitations

As a result of convenience sampling, this study was limited by several factors. Firstly, it was of a small sample size of 21 students, and the samples sizes were imbalanced between Class A and B relative to each other, 9 and 12 respectively. Secondly, the study was conducted over a short span of three weeks due to external factors. A longer study may produce more worthwhile data. Furthermore,

the content and discussion topics differed between the two classes, which may have had some unforeseen impact on students' engagement and motivation. Lastly, all participants were non-native speakers of English with a variation in ability and confidence which may have affected the nature and volume of their contributions to the online discussions.

Delimitations

The participants in this study were chosen because of their enrollment in the researcher's courses due to ease of access to both the students and the means to measure their forum participation. The researcher in this study chose to evaluate only the volume and not the quality of posts in this study. This choice was made with concern to action research's iterative nature. Once the existence of a relationship between the use of achievement badges and post volume was determined, then a following study examining achievement badges and post quality could be conducted.

Bias

Due to the non-random selection of participants in this study and the differing nature of the two elective courses, unintended bias may exist.
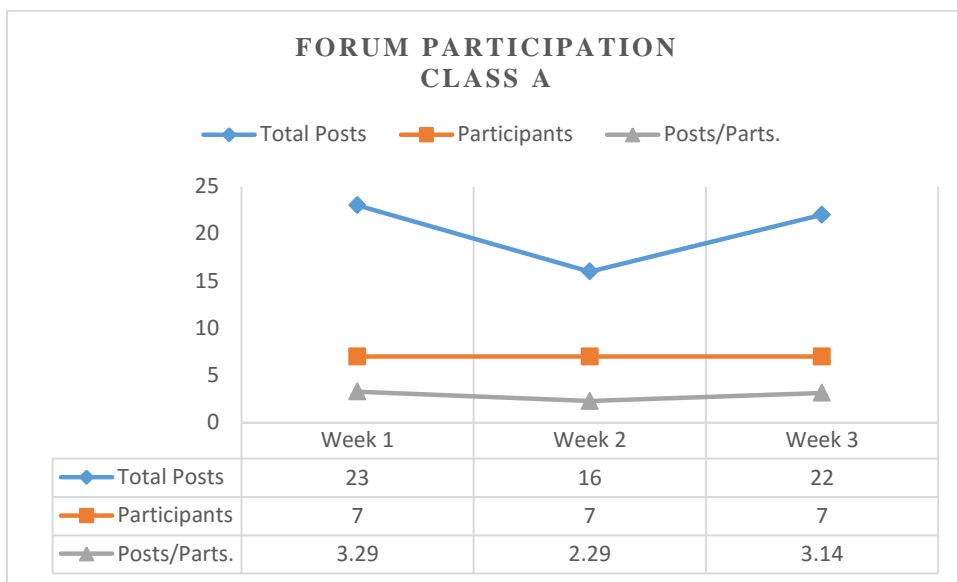
Data Analysis

The total number of posts per week and average post per student for each class was graphed using Microsoft Excel. These results were compared to determine what, if any, relationship exists between the use of achievement badges and student participation in online discussions. Results will be presented in graphs. As no test of significance will be performed, generalizations cannot be made.

IV. RESULTS

Each student's weekly contribution to the discussion forums was recorded as well as the total number of participants and number of comments in each forum. This data was then entered in a spreadsheet where it could be evaluated and represented graphically.

In Class A, the sample of nine students that received badges, total posts dipped from 23 in week 1 to 16 in week 2 before rebounding to 22, in week 3. It is of note that week 3, while higher than week 2, did not exceed week 1.

The total number of participants engaged in the online discussions remained the same throughout all three weeks, and similar to the number of total posts, the number of posts per participant dipped from 3.29 in week 1 to 2.29 in week 2 and then rose to 3.14 in week 3.

FORUM PARTICIPATION
CLASS A

|	Week 1	Week 2	Week 3
Total Posts	23	16	22
Participants	7	7	7
Posts/Parts.	3.29	2.29	3.14

When looking at the number of posts per student, it can be seen that for nearly every student the number of weekly posts remained the same or was lower in week 3 compared to week 1. Only student 8, who did not participate in the first week's discussion, shows an upward trend in the number of posts, with four posts in week 2 and 3 each. Students 3 and 5 consistently made the same number of posts per week; student 5 never participating in the online discussions during the study while student 3 posted a consistent three times per week. Students 2, 6, and 9 show a drop in the number of posts over the study, whereas students 1, 4, and 7 display an initial drop after week 1 but rebound in week 3, albeit never higher than their contributions in week 1.
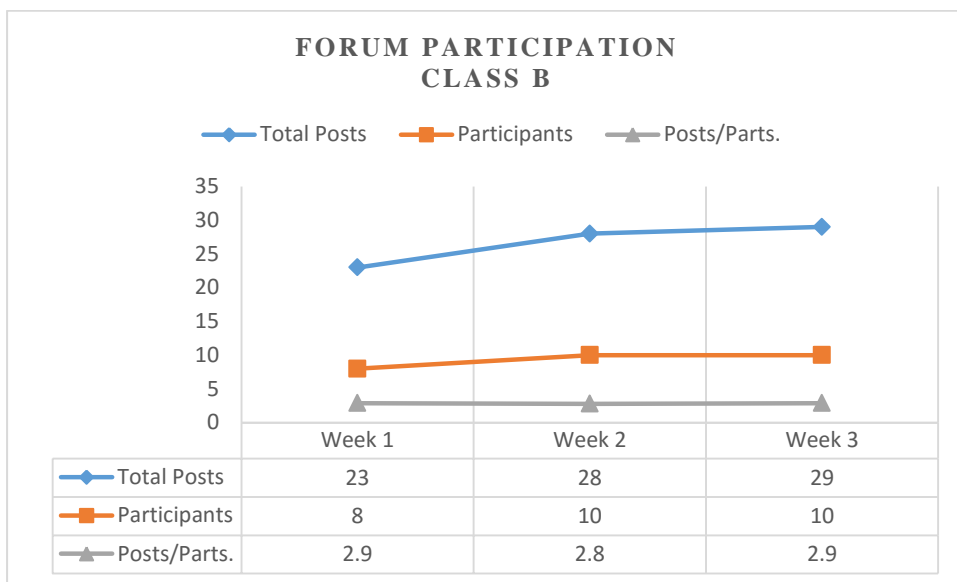

POSTS PER STUDENT PER WEEK
CLASS A
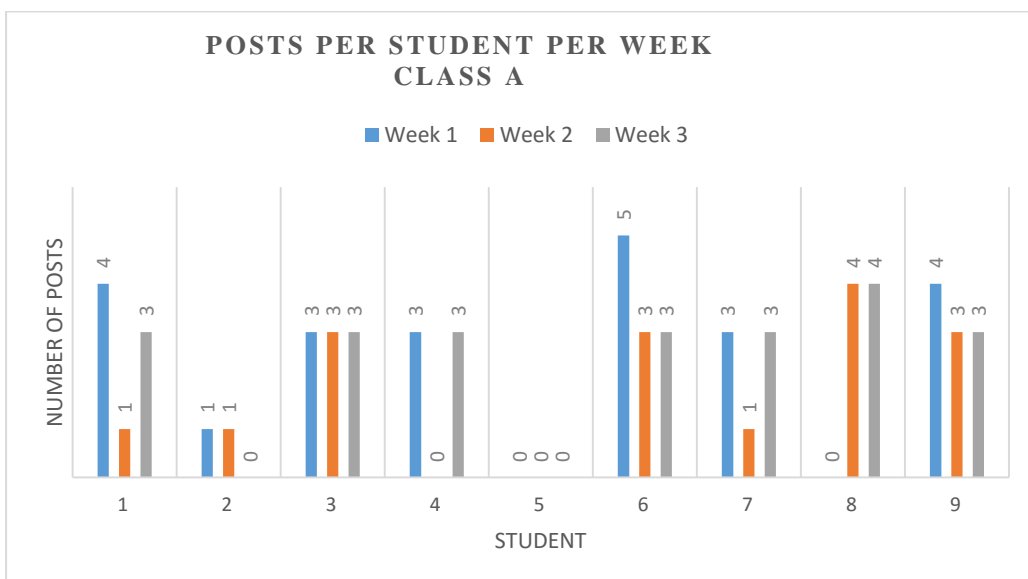
Badges were awarded based on the number of posts made per week. Bronze badges were given to any student who met the required minimum of three posts per week. Three bronze badges were given in week 1, five in week 2, and two in week 3. Students who posted one to three posts more than the required minimum received silver badges. There were three silver badges in week 1, three in week 2, and 6 in week 3. Students who posted four or more times beyond the minimum would have received gold badges, but no participants met this threshold.

BADGES PER WEEK
CLASS A

	Week 1	Week 2	Week 3
No Badge	3	5	2
Bronze	3	3	6
Silver	3	1	1
Gold	0	0	0
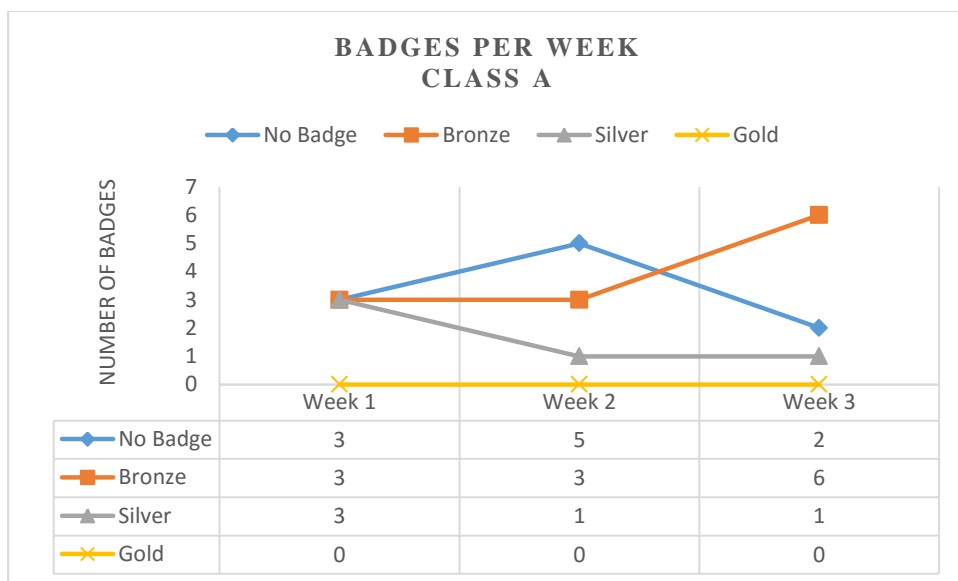
Class B, the control group of twelve students, did not receive any achievement badges relating to the number of posts made per week. The total number of posts made by Class B rose each week from 23 in week 1 to 28 in week 2 and 29 in week 3. Likewise, the number of participants also increased from eight in week 1 to ten in week 2 and 3. The number of posts per participants dropped from 2.9 to 2.8 between weeks 1 and 2 but returned to 2.9 in week 3.

**FORUM PARTICIPATION
CLASS B**

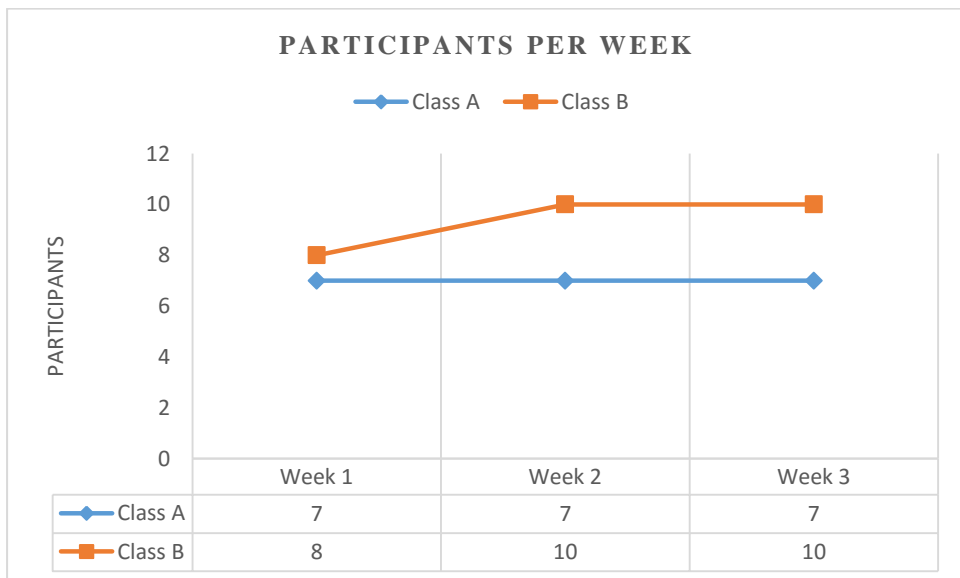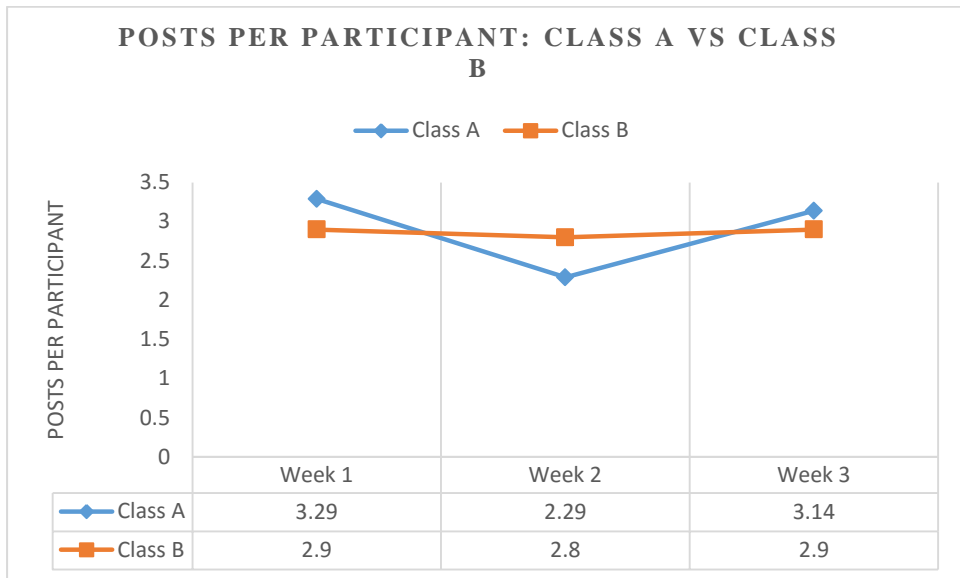|	Week 1	Week 2	Week 3
◆ Total Posts	23	28	29
■ Participants	8	10	10
▲ Posts/Parts.	2.9	2.8	2.9

Regarding the number of posts per individual student made in Class B, students 2, 4, 6, 7, and 12 remained unchanged during the study. Students 6 and 7 made no posts for the duration of the study. Students 1, 3, and 11 each saw an increase in posts between week 1 and 3. Students 5 and 9 show a drop between weeks 1 and 2 but rebound in week 3 yet do not exceed week 1.

**POSTS PER STUDENT PER WEEK
CLASS B**
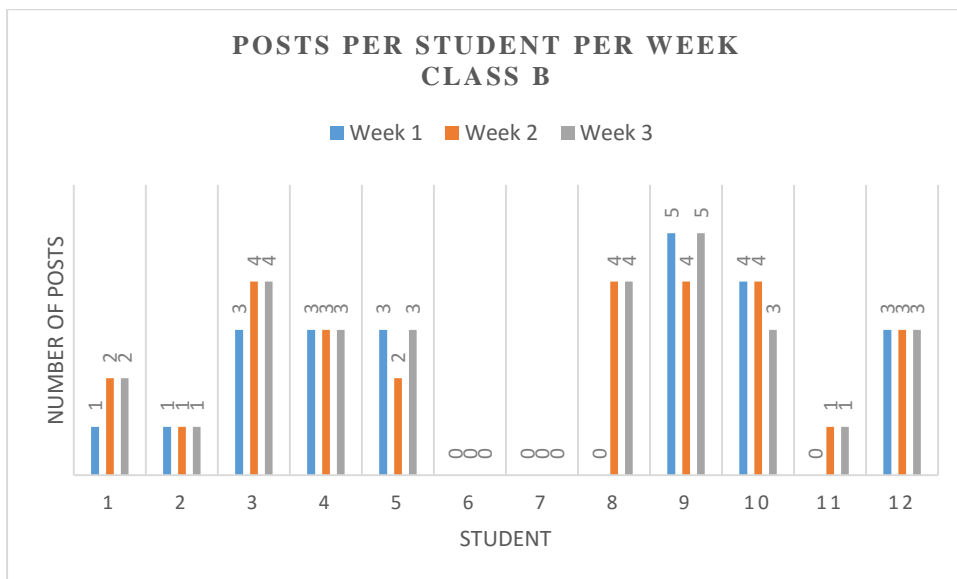
The following graphs compare posts per participant and participants per week between Class A and B. Class B remained largely consistent in posts per participant over the length of the study whereas Class A, although higher in weeks 1 and 3, dipped below Class B in week 2. Class A held steady with regards to

participants per week while Class B saw an increase between week 1 and week 2 that was maintained into week 3. Averaged over the duration of the study, Class A made 2.91 posts per participant whereas Class B made 2.87 posts per participant, a 1.37% difference.

POSTS PER PARTICIPANT: CLASS A VS CLASS B

	Week 1	Week 2	Week 3
Class A	3.29	2.29	3.14
Class B	2.9	2.8	2.9

PARTICIPANTS PER WEEK

	Week 1	Week 2	Week 3
Class A	7	7	7
Class B	8	10	10

V. DISCUSSION

The results of this study indicate that the use of digital achievement badges had little to no positive effect on the number of posts per participant, nor the posts per

week. When compared to a control group that did not receive any badges, Class A showed only a 1.37% increase in the number of posts per participant. Further to the contrary, the control group demonstrated a more consistent number of posts per participant and an increasing number of participants per week than the experimental group, possibly indicating a negative relationship between the use of badges and student participation in online discussions. However, the length of this study and the size of the nonrandom sample is suboptimal and could be an important contributing factor to nature of this study's results.

VI. CONCLUSION

This study investigated the relationship between the use of digital achievement badges and online discussion forum participation in a blended-learning course by recording and comparing the number of posts per participant and participants per week in an experiment and control class. Students in the control class who made the minimum number of posts per week, as outlined in the course syllabus, received a bronze badge. Students who posted one the three times beyond the minimum received a silver badge, and students who posted four or more times more than the requirement received a gold badge. The control class received no badges or other extrinsic motivation related to the number of posts made beyond the minimum.

The results of this study indicate that there was little to no positive relationship between the use of badges and discussion forum activity in the experiment class. Contrarily, the control class demonstrated more stability in the number of posts per participant and an increase in participants per week.

However, the length of this study was short, and its sample sizes were small and nonrandom. Further research into this topic would do well to extend then length of the study and use larger samples with more robust selection criteria.

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