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Enhancing Engagement in a Learning Management System through a Raffle Ticket System

ABSTRACT

Learning management systems (LMS) are essential components of courses, yet student engagement on these platforms remains a significant challenge. Traditionally, grades have been used to incentivize student engagement, but this approach comes with drawbacks. In this paper, we explored an alternative form of incentivization, gamification, that has gained traction in higher education. We implemented a gamified raffle ticket system aimed at enhancing asynchronous engagement with our LMS, Microsoft Teams, in a third-year undergraduate elective health sciences course during the fall 2023 semester. We defined engagement as students' voluntary participation and interaction in LMS-related activities. Students earned raffle tickets for various participatory activities using the LMS—including making a post, replying to a thread, and reacting to posts—which were later entered into a drawing for prizes. Student participation in these activities was tallied and used as quantitative data of engagement. We recorded engagement metrics for three different semesters of the same course: fall 2023 in which the raffle ticket system was implemented; and fall 2021 and fall 2022 before the implementation of the raffle ticket system. Results indicated a substantial increase in engagement metrics following the raffle ticket system's introduction. Our findings suggest that the gamified raffle ticket system effectively incentivized student engagement, fostering a more interactive and supportive online learning community in the LMS. Thus, this paper offers a framework for educators who are looking to adopt a gamification strategy into their own courses to engage students to interact in an LMS.

KEYWORDS

learning management system, gamification, incentivization, student engagement, asynchronous learning

INTRODUCTION

Technological advancements have significantly propelled and supplemented traditional classroom education. Learning management systems (LMS) are online software systems that provide an important infrastructure to support various educational activities, including tools to create, deliver, and house content, monitor student participation, and log student performance (Turnbull, Chugh, and Luck 2021; Veluvali and Surisetti 2022; Weaver, Spratt, and Nair 2008; Yueh and Hsu 2008). Although LMS have become a crucial component of courses, it is challenging to encourage students to engage asynchronously with each other and with the course-related activities and materials on these platforms (from here on discussed simply as engagement on an LMS) (Ashrafi et al. 2022; Rasheed, Kamsin, and Abdullah 2020). The literature has documented an array of factors that impact student engagement with LMS. Some studies, for example, have suggested students feel LMS are too formal

and opt instead to communicate with peers through social media platforms (Deng and Tavares 2013; Hamid et al. 2022; Sobaih et al. 2021). This lack of engagement appears to have been exacerbated during the COVID-19 pandemic; the primary concern for students shifted from content to engagement during the transition to a virtual environment. Although the reasons for this are not entirely clear, they have been attributed to factors such as increased distractions, reduced social accountability, and decreased interactions with peers and instructors (Hollister et al. 2022; Perets et al. 2020).

Within an education context, engagement has been associated in general with many positive outcomes such as retention, achievement, and academic performance (Kahu and Nelson 2018; Lee 2014; Lei, Cui, and Zhou 2018). Thus, addressing the issue of low engagement within an LMS is a critical challenge that educators must navigate. Student engagement is a multifaceted construct that has been debated in the literature. Although efforts have been made to classify engagement into different dimensions (e.g., behavioral, emotional, cognitive), there is increasing acknowledgement that these dimensions overlap (Hu and Hui 2012; Wong and Liem 2022). Therefore, for the purposes of the present paper, we opted for a holistic definition of engagement within an LMS: Students' voluntary participation and interaction in LMS-related activities. This holistic definition also allows us to capture engagement across the variety of activities that formed the parts of our intervention.

Incentivization

A variety of strategies may be used to incentivize and encourage student engagement and performance in order to promote learning. Incentivization relies on motivation, a driving force that influences students' engagement. These motivations can either be internally driven due to inherent curiosity and a desire to learn (intrinsic motivation) or externally driven to receive external rewards (extrinsic motivation) (Allan and Fryer 2011; Ryan and Deci 2000).

Grading is the most traditional and well-known form of incentivization in education. Grades, an external motivator, are deeply embedded in education systems and were historically used to both quantify student learning and as an incentive to reinforce student behaviors, such as student engagement and participation, including in LMS (Gordon et al. 2018; Kahn 2005). This approach, however, has recently undergone much criticism (Cain et al. 2022). Studies have shown that grading can cause stress, anxiety, and a fear of failure (Chamberlin, Yasué, and Chiang 2023). Furthermore, grading fosters comparison with peers that may contribute to feelings of inadequacy and lower self-esteem, particularly among students who struggle to meet high academic standards (Cain et al. 2022; Chamberlin, Yasué, and Chiang 2023; Suldo et al. 2009). There is additional evidence to suggest that some students choose not to participate in classes, irrespective of grades, due to factors such as nervousness or feelings of intimidation (Rocca 2010). Therefore, the exploration of alternative incentivization methods beyond grading is important for fostering an educational environment that prioritizes student engagement and well-being.

Gamification is an emerging form of incentivization in education spaces that involves the integration of game elements (e.g., point systems, badges) to increase engagement and motivation in learning (Dichev and Dicheva 2017). There is much evidence of the positive impact of gamification in education contexts, including increased engagement, knowledge acquisition, and cooperation (Dichev and Dicheva 2017; Krause et al. 2015; Mohamad, Sazali, and Salleh 2018; Tvarozek and Brza 2014). Building upon the benefits of gamification in educational contexts, we discuss a gamified raffle ticket system in this paper that was designed to engage students in an LMS. This approach integrated the concept of token reinforcement, where we awarded tokens (in this case, raffle tickets) for desirable behaviors such as participation. These raffle tickets were then exchanged for a chance to win various prizes, combining the elements of chance and reward to further motivate students. Token

reinforcement systems, like our raffle ticket system, leverage the motivational impact of rewards to encourage repeated engagement and effort among students (Glascott and Belfiore 2019; Saber 2017).

The effect of such a token-based reinforcement system on behavior is well researched and intrinsically tied to principles of operant conditioning, which posit that behaviors increase or decrease depending on the consequence of that behavior. For example, behaviors that are reinforced (a positive consequence) tend to increase, while those that are punished (a negative consequence) tend to decrease (for an overview of operant conditioning in the classroom, see Akpan 2020). Within the context of the present paper, our raffle ticket system reinforced LMS engagement through the use of rewards (i.e., prizes). Additionally, the randomness of reward distribution in our raffle ticket system added an element of unpredictability and excitement, which can enhance engagement and motivation beyond traditional point-based gamification methods (Zhao 2021). This randomness (or variability) of reward tends to increase the frequency of the desired behavior because it is difficult to know when or if the reward will be provided (Doll, McLaughlin, and Barretto 2013; López and Menez 2005). Although such an incentivization strategy relies on external rewards, there is some suggestion in the literature that external rewards may not impact intrinsic motivation as strongly as traditionally perceived (Allan and Fryer 2011; Jones, Blanton, and Williams 2023). Thus, a raffle ticket-based approach allows for the recognition of effort and achievements in a way that can be more inclusive and motivating for a broader range of students, potentially mitigating some of the negative aspects of grades.

This quality improvement paper is guided by the following question: To what extent does a gamified, raffle ticket system increase student engagement in an LMS? This case study aims to illustrate how a raffle ticket system can be effectively implemented to increase asynchronous student engagement and motivation in an LMS. Through this exploration, the paper seeks to contribute to the broader understanding of gamification strategies in education, offering insights into how such systems can be designed to enhance students' engagement and the overall educational experience. Importantly, as this paper is co-written with two student partners, one of whom experienced the raffle ticket system, the thoughts and viewpoints presented throughout the paper encompass student voices.

METHODS

Context

Our raffle ticket system was implemented in a student-directed, third-year elective course, Science of Fictional Characters, that focuses on the development of science process skills (e.g., problem-solving, hypothesis generation, science communication) (Wong et al. 2024). This course is situated within an undergraduate health sciences curriculum within the Honours Health Sciences (BHSc) Program at McMaster University, a large research-intensive university where the majority of students enroll after high school (McKinnell et al. 2005). In this medium-sized undergraduate course (~30 students), students are asked to generate hypotheses about the seemingly impossible attributes of fictional characters. Due to its student-directed, problem- and inquiry-based approach and focus on science process skills, engagement is essential for a positive learning environment. Students are thus encouraged to engage with each other in class and asynchronously in Microsoft Teams for Education, the LMS used in this course. Engagement can take a variety of forms, including having discussions or providing feedback or encouragement to each other. These forms of engagement mimic crucial science process skills, such as communication, scientific dialogue and discourse, and peer feedback (for description of the course and activities, please see Wong, Al-Arnawoot, and Hass

2022; Wong et al. 2024). While engagement during class time has traditionally been strong, asynchronous interaction and discussion in the LMS have been lacking.

This trend continued at the beginning of the course during the fall 2023 semester (see Figure 1). As a result, we piloted a gamified raffle ticket system in week six with the intent of increasing student engagement in the LMS for the remainder of the semester.

The raffle ticket system encouraged students to engage in two ways (Table 1):

1. Discussions in LMS: Students received raffle tickets in one of three ways: Three tickets for making an original post, two tickets for replying to an existing post, and one ticket for reacting to a post.
2. Collaboration in the LMS: To encourage collaboration and feedback in the course, we awarded students one raffle ticket for providing formal feedback to a peer; this required evidence, such as a feedback post in the LMS or a document with "tracked changes." We also awarded one raffle ticket for a substantial and positive contribution to their group (e.g., supporting a member); this required a "kudos" from a group member by completing a brief Microsoft Form to describe the action.

To encourage various forms of engagement (e.g., making a post, providing feedback, reacting to a post), a maximum number of tickets that could be earned each week was placed on certain actions. Additional actions beyond this limit were not awarded with raffle tickets. For example, a student could only receive raffle tickets for reacting to 10 posts a week to encourage students to engage in more thoughtful tasks such as making original posts and replying to others. A limit was placed for the kudos category as we wished to encourage thoughtful consideration from students about which members of their groups provided substantial contributions. We did not, however, place a limit on providing formal feedback to a peer as we wanted to encourage collaboration across groups and within the class. The number of raffle tickets in general reflected the time demands of the tasks. For example, making an original post was awarded more raffle tickets than simply making a reaction to an existing post. Although feedback to a peer is a time-demanding task, we only provided one raffle ticket for this action since there was no limit on the number of raffle tickets that could be earned for this category.

At the end of each week, the instructor tallied the number of actions performed by each student in the LMS. At the end of each week's class, students received physical raffle tickets earned the previous week. At the end of the semester, students entered their raffle tickets into a drawing for prizes. Since the raffle ticket system was in pilot mode, the type and number of prizes were not made apparent to students until the last day of class when the draw for prizes occurred. Ultimately, there were 10 prizes in total, all provided by the instructor, including artwork, action figures, plushies, and jigsaw puzzles, which reflected the course's focus on fictional characters.

Table 1. Raffle ticket system

Engagement category	Action	Raffle tickets earned	Maximum actions / week
Discussions	Original post	3	3
	Reply	2	3
	Reaction	1	10
Collaboration	Feedback to a peer	1	No maximum
	Kudos	1	1

Quantitative data

To quantify the effectiveness of the raffle ticket system, the authors manually tallied the number of each engagement metric—making an original post, replying to a thread, and reacting to posts—that students performed on the LMS for the Science of Fictional Characters class. We defined a discussion thread started by a student as an original post; a reply to an existing discussion thread as a reply to a thread; and a reaction to any message as a reaction to a post. We separated the counts by week in this 13-week course. Each week was defined as the period between the start of one week's class and the start of the following week's class. Exceptions were made for week one, week six, and the exam period (from here on referred to as week 14). All actions on the LMS leading up to the first day of class were counted for week one; all counts during the week-long fall break that preceded week six were included in the counts for week six; and, lastly, all actions that occurred after the beginning of the last class and the end of the exam period were counted for week 14. The tallies only included student actions and not those from the instructional team.

For comparison, we also tallied the engagement metrics for the fall 2021 and 2022 semesters and used these tallies as the quantitative data in the present project.[1] To ensure accuracy, all tallies were counted at least two times for all semesters. Due to the large number of posts, replies, and reactions in the LMS for the fall 2023 semester, counts were also cross-checked by two authors. In the event of discrepancies, both authors re-counted their tallies to ensure the numbers matched.

The number of formal feedback documents and kudos provided by students in the LMS and Microsoft Forms were also tallied for the collaboration actions of the raffle ticket system.

RESULTS

Discussions category

Overall, the total number of posts, replies, and reactions was highest in the fall 2023 semester (Table 2). There were 139 posts, 288 replies, and 3,085 reactions for the fall 2023 semester compared to 17 posts, 24 replies, and 127 reactions for the fall 2021 semester and 9 posts, 17 replies, and 88 reactions for the fall 2022 semester (Figure 1, Table 2). Notably, in the fall 2023 semester, week 6 had the largest number of posts, which coincides with when we implemented the raffle ticket system. Additionally, although the maximum number of raffle tickets that could be earned for week 13 was 300 (i.e., 30 students by 10 tickets maximum each for reactions), there were 954 reactions.

There was also a large number of unique students who made at least one post, reply, or reaction during the fall 2023 semester following the implementation of the raffle ticket system. Prior to the implementation of the raffle ticket system, week 5 had the greatest level of engagement across posts, replies, and reactions; out of the 30 students in the class, six students made at least one original post, three students replied to an existing post, and 14 students made at least one reaction. By

contrast, after implementation of the raffle ticket system, engagement was higher across all metrics, particularly during week 13; 11 students made at least one original post, 23 students replied to an existing post, and 29 students made at least one reaction (Table 3).

Collaboration category

Formal feedback to a peer was not provided, and there were three kudos submitted.

Table 2. Total counts of posts, replies and reactions in the fall 2021, 2022, 2023 semesters

	Posts			Replies			Reactions		
Week	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**
1*	0	0	0	1	0	0	5	4	3
2	0	0	0	7	0	0	12	2	5
3	0	0	0	1	0	0	2	0	11
4	1	0	1	2	7	1	5	16	8
5	1	1	9	1	4	6	6	19	22
6**	5	3	67	5	0	0	25	3	225
7	0	0	0	0	0	8	2	0	114
8	0	0	2	2	1	18	13	4	147
9	2	2	3	2	2	31	9	11	431
10	1	2	5	0	3	23	7	4	225
11	3	0	17	1	0	55	15	1	717
12	1	1	16	0	0	19	2	6	142
13	2	0	14	0	0	111	2	3	954
14***	1	0	5	2	0	16	22	15	81
Total	**17**	**9**	**139**	**24**	**17**	**288**	**127**	**88**	**3085**

*Week one includes all interactions before the first day of class.

**Week six includes all interactions occurring during McMaster University's fall break. Week six is also when the raffle ticket system was implemented during the fall 2023 semester.

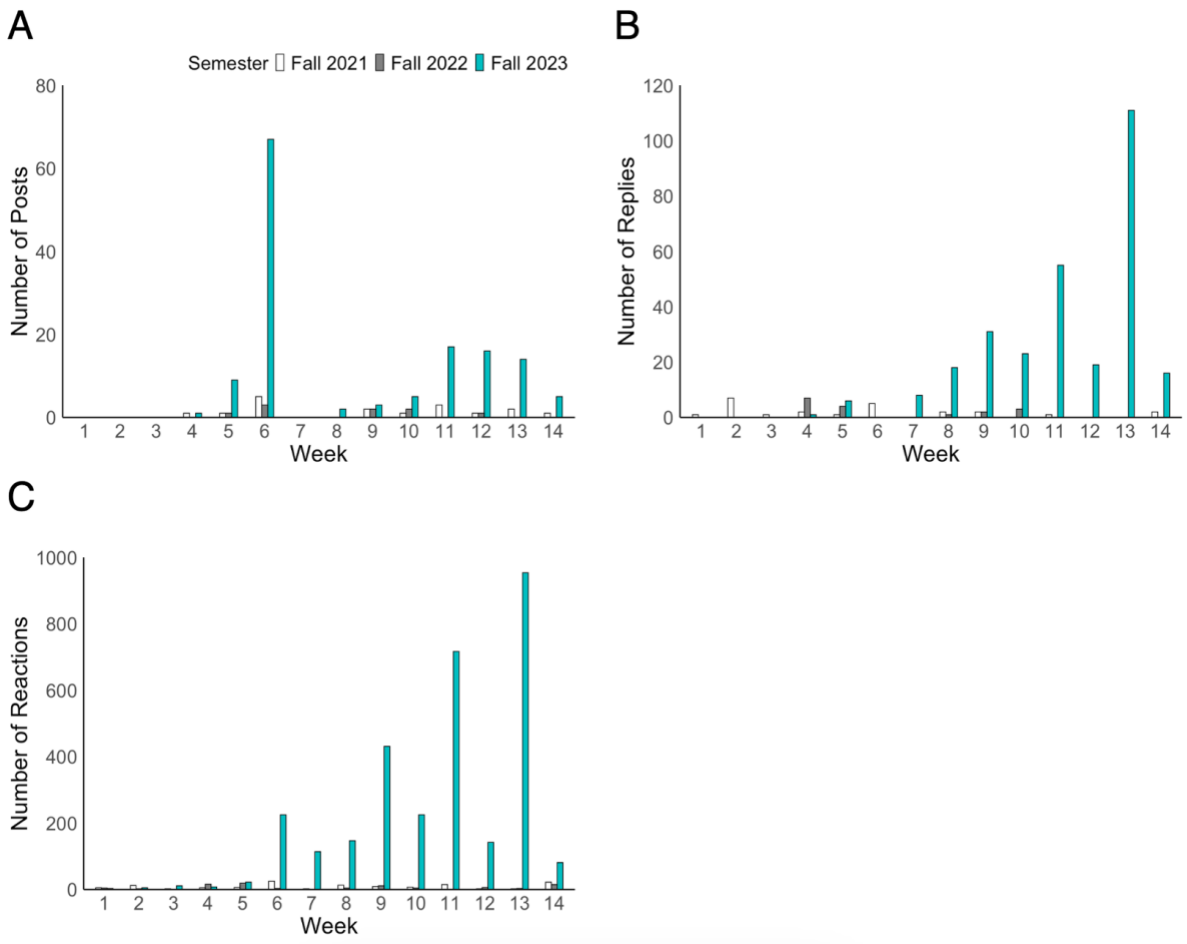
**Week 14 represents the exam period.

Table 3. Number of unique individuals who made at least one post, reply, or reaction each week during the fall 2023 semester

Week	Posts	Replies	Reactions
1	0	0	3
2	0	0	5
3	0	0	8
4	1	1	7
5	6	3	14
6	19	0	27
7	0	8	16
8	1	11	24
9	2	21	23
10	5	14	20
11	10	23	27
12	10	8	19
13	11	23	29
14	3	13	24

Note: There were 30 students in the class during the fall 2023 semester.

Figure 1. Number of posts (A), replies (B), and reactions (C) in the LMS in each week of the fall 2021 (white), fall 2022 (grey), and fall 2023 (teal) semesters



DISCUSSION

Our findings suggest the raffle ticket system successfully encouraged engagement in the LMS. We consider both the practical and theoretical aspects of our gamification approach and provide recommendations for wider applications.

Trends

Holistically, the results indicate increased student engagement after the implementation of the raffle ticket system. There was a marked increase in the engagement metrics including posts, replies, and reactions in the fall 2023 semester after we implemented the raffle ticket system in comparison to the fall 2021 and fall 2022 semesters (Figure 1). The success of our raffle ticket system in increasing student engagement on an LMS can be explained using the theory of operant conditioning. In general, the theory of operant conditioning posits that behaviors increase or decrease depending on if that behavior is reinforced or punished. Various applications of this theory have been applied in education settings in order to increase positive student behaviors. For example, in a recent scoping review, Rafi, Ansar, and Sami (2020) reported that reinforcement, such as praise and constructive feedback, were effective in increasing positive student behaviors such as self-efficacy

and motivation. Similarly, token reinforcement systems make use of reinforcers in the form of tokens—neutral stimuli that are paired with rewards—to increase a desired behavior (Doll, McLaughlin, and Barretto 2013). Our raffle ticket system is an example of a token reinforcement system in which we paired raffle tickets (tokens) with prizes (rewards) to increase student engagement on an LMS (desired behavior).

Although the effectiveness of token reinforcement systems is well documented (Doll, McLaughlin, and Barretto 2013), we are the first, to our knowledge, to apply such a system in order to increase student engagement on an LMS. Notably, we saw increases in student engagement across engagement metrics following the introduction of the raffle ticket system. These metrics demonstrated an upward increase from week six onward during the fall 2023 semester, whereas the engagement metrics remained relatively low for the fall 2021 and fall 2022 semesters (Figure 1). Therefore, it appears the introduction of the raffle ticket system resulted in a substantial uptick in engagement. After further reflecting on our results, we wondered whether the large increases across our engagement metrics resulted from the inclusion of multiple prizes in our raffle ticket system. Previous research found that the desired behavior tends to increase more when there are a variety of rewards in a token reinforcement system than when there is a single reward (Sran and Borrero 2010). Future research should explore this further in an education setting.

We noticed a gradual increase over the fall 2023 semester specifically regarding the reactions and replies metrics, with a sharp decrease after week 13. The gradual increase during the semester may be explained by our schedule of reinforcement, a fixed-interval schedule in which a reward is presented after a specified amount of time. Previous research found that in fixed-interval schedules of reinforcement, the frequency of a desired behavior tends to be highest during the period that immediately precedes the reward (López and Menez 2005). Similarly in our findings, as the allotted time period for the reward-attaining behavior neared the end of the semester, motivation, and therefore engagement, increased with the intent of maximizing the chances of attaining a reward. The decrease in engagement observed past week 13 may be attributed to an increased workload around the exam period, which limited the time students had to engage with the course. Furthermore, as the raffle was conducted in the week prior to the exam period (week 13), this decreased engagement may be a result of the absence of a reinforcer or reward—similar to how a pause occurs after the reinforcer is provided in a fixed interval reinforcement schedule of reinforcement (López and Menez 2005).

Interestingly, this same trend was not observed in the original post metrics for the fall 2023 semester. In this semester, the midpoint of the semester (week six) had the largest number of posts, which was followed by a reduced and consistent number of posts over the remainder of the semester. The stark increase in week six is likely a result of two reasons: posts during the week-long fall break were cumulatively tallied and included in week six of the course; and students were asked to share their "plan of action" presentation resources prior to the fall break. The lack of a gradual increase in posts over the semester may be because students viewed original posts as a more time-consuming and mentally demanding form of engagement in comparison to reactions and replies. This may also explain the low level of engagement with the collaboration category of the raffle ticket system—no formal feedback was provided to a peer and only three students submitted kudos for a group member.

Ultimately, the overall trend of increased engagement in the fall 2023 course offering suggests that the raffle ticket system successfully incentivized student interaction in the LMS, particularly in terms of reactions and replies. Future system implementations should consider ways in which more time-demanding tasks, such as making an original post or providing formal feedback to a peer, might be incentivized.

Implications and considerations

Empirical studies suggest that gamification has the potential to enhance student engagement and help achieve specific educational outcomes by aligning game elements with curriculum and course goals (van Gaalen et al. 2021; Zainuddin et al. 2020). This paper contributes to the expanding body of knowledge on gamification in education by providing evidence of the positive effects of a token reinforcement system, specifically a raffle ticket system, on student engagement within an LMS in this context.

Fostering a sense community and belonging

The implications of our findings extend beyond the immediate increase in engagement metrics, with the raffle ticket system possibly fostering a more vibrant and lively community within the LMS. In addition to course-related discussions, for example, we noticed students made posts and replies in the LMS to discuss personal interests such as pets and music preferences, while also encouraging each other. Students sharing their personal interests in the LMS suggests our raffle ticket system may have circumvented a barrier previously reported in the literature, that is, students opting to communicate with their peers using external social media platforms because they perceive an LMS to be too formal (Deng and Tavares 2013; Hamid et al. 2022; Sobaih et al. 2021). Thus, the inclusion of a gamified raffle ticket system may have made the LMS more fun and less formal.

Literature on online learning environments have suggested building social connections is crucial for creating a positive learning environment. Some suggestions for creating this environment include incorporating technologies that allow multimodal interactions, instigating activities that help students get to know each other, and encouraging conversation (Chen and Bogachenko 2022; Dikkers, Whiteside, and Lewis 2012; Garrison, Anderson, and Archer 2000). Thus, in the context of the present paper, although the informal conversations were not always directly related to course material, it is possible these additional interactions helped foster a community of belonging, as students were able to share something personal about themselves and feel supported by their peers. There is a growing body of literature to suggest that when students feel they belong to a classroom space, they are more likely to succeed (O'Keeffe 2013; Tachine, Cabrera, and Bird 2017; Vaccaro and Newman 2016; Wong 2024; Wong et al. 2024).

Given the importance of community building and a sense of belonging in a classroom, it would be helpful to consider ways in which instructors might encourage students to use the LMS for both academic and non-academic discussions. Since students tend to feel LMS are too formal (Deng and Tavares 2013; Hamid et al. 2022; Sobaih et al. 2021), making this more explicit might encourage more informal discussions. Additionally, within the context of our raffle ticket system, it may be helpful to make it explicit that conversations, whether course-related or not, are eligible for earning raffle tickets, which could potentially increase the extent to which students make original posts.

Extrinsic vs. intrinsic motivation

One possible limitation of our raffle ticket system is its inherent reliance on external rewards, rather than intrinsic motivation. However, from our experience, this system nonetheless effectively drew students into the LMS. Compared to previous offerings of the course without a raffle ticket system, students were more informed about course expectations and updates, and there was a stronger sense of community among students. More specifically, there were fewer questions related to assignment due dates and expectations, as well as increased preparedness (e.g., reading class material) before class discussions. Additionally, students made posts in the LMS that were directly

course-related, including asking questions and supporting each other. Although no formal feedback was provided (as defined by the raffle ticket system), students provided encouragement to each other, which included words of affirmation after course assessments (e.g., presentations), and shared ideas for projects. There is evidence in the literature that a positive relationship exists between student LMS use and academic performance (Sahni 2023). Therefore, regardless of motivational concerns, there are apparent benefits of the system, especially since our raffle ticket system was completely voluntary and did not have an impact on student grades.

Additionally, some authors have suggested that some extrinsic motivation may ultimately lead students to develop intrinsic motivation (Shields and Chugh 2017). We feel our raffle ticket system might have facilitated a degree of intrinsic motivation among students. While it is difficult to disentangle the two forms of motivation, we noticed (as discussed above) that students began to use the LMS for non-academic discussions during the fall 2023 semester, which we did not observe in the previous two offerings of the course. Given students tend to feel LMS are too formal (Deng and Tavares 2013; Hamid et al. 2022; Sobaih et al. 2021), we suspect the raffle ticket system helped students overcome the discomfort of this perceived formality which then enabled them to have informal conversations with each other on the LMS. Additionally, although engagement on the LMS did decrease after the raffle, engagement metrics remained substantially higher in week 14 for the fall 2023 semester than the two previous offerings of the course. Since raffle tickets were not given in week 14, this suggests the raffle ticket system may have instilled some intrinsic motivation among the students. In further support of this, many students engaged in the LMS even after earning the maximum number of tickets in a given week. For example, there were 954 reactions during week 13, even though the maximum number of raffle tickets that could be earned that week was 300.

Resource availability and prizes

Another notable consideration involves the accessibility and feasibility of implementing a raffle ticket system across various socioeconomic contexts. The effectiveness of gamification strategies that rely on physical rewards may be difficult in education settings with limited resources and budgets. A potential means to overcome this limitation might require instructors to apply for grants or supplementary budgets in order to support the implementation of this measure. Another solution might involve digital badges or certificates, which may serve as cost-effective alternatives to physical rewards, though their perceived value and motivational impact may differ significantly from physical prizes (Hakulinen and Auvinen 2014; Tvarozek and Brza 2014).

Previous literature has provided some suggestions for successful implementation of digital badges, such as considerations of duration and the importance of feedback. For example, while digital badges appear to engage students in learning activities, the positive effects appear to decrease over time perhaps due to a declining novelty effect (Garnett and Button 2018; Toda, Valle, and Isotani 2017). Thus, in considering the implementation of digital badges in an educational setting, it would be important to carefully consider the duration and which components of learning to reinforce in order to avoid oversaturating the novelty of the badges. As part of this process, it would also be important to receive feedback from students so the badge system can be tailored in a way that motivates the specific demographics of the class. For an example of how one might embed a digital badge gamification system in their course(s), refer to Shields and Chugh (2017).

Metrics-tallying

A logistical consideration of implementing a gamification strategy that relies on tracking specific student actions within an LMS concerns the potential need for instructors to manually tally

engagement metrics such as posts, replies, and reactions. This process might be laborious, tedious, and time-consuming, detracting from the time instructors can spend on other educational tasks, such as lesson planning, content creation, and student feedback. This limitation not only affects the scalability of such gamification strategies across larger classes but may place an administrative burden on educators as well.

Manual tracking also introduces the possibility of human error, which can lead to inaccuracies in the reward system and potentially undermine the system's fairness and effectiveness. Addressing this limitation might involve LMS features that automate the tracking and tallying of engagement metrics, thereby streamlining the implementation process and ensuring accuracy and fairness. For example, Microsoft Teams for Education offers an "analytics" option, which provides information about student engagement metrics, such as posts, replies, and reactions. We recognize that some LMS may not have an automated engagement metrics feature; therefore, another option might involve student self-reported engagement metrics which could be compared to the instructor's tally at various time points during the course. This method has the potential to reduce human error through ensuring corresponding values; that said, whether this strategy will further incentivize students as they pause to count or disincentivize students due to the effort involved is unclear. Lastly, one could place further constraints on the maximum number of raffle tickets that could be earned, perhaps for the less time-consuming interactions, such as making a reaction. This will not only decrease the amount of time tallying these metrics but may provide the additional benefit of encouraging students to engage in the more time-demanding tasks, such as making an original post.

Timing

Intricacies behind operant conditions and schedules of reinforcement should be considered when deciding the timeframe of reinforcement in order to ensure optimal engagement (López and Menez 2005). For example, we observed a gradual increase in engagement over the semester after the introduction of the raffle ticket system with a stark decrease in post-reinforcement. Engagement may also decrease once the novelty of gamification wears off (Ratinho and Martins 2023). Thus, considering ways in which one might encourage sustained engagement over the semester might lead to even greater benefits than those observed in this course.

Competition vs. cooperation

Lastly, discretion should be employed to ensure that the competition fostered by gamification does not lead to undue stress or interpersonal conflict among students. Instructors should monitor for signs that the competitive elements are becoming detrimental to the learning environment or students' well-being and be prepared to make adjustments if needed. The current literature emphasizes the importance of careful design in gamification in order to avoid negative outcomes, as overly competitive environments without supportive elements can reduce engagement and exacerbate anxiety and stress among students (Ratinho and Martins 2023). One way in which this might be fostered is to emphasize the importance of and provide reinforcers for cooperative behaviors, similar to our implementation of prizes for collaboration. Additionally, creating an environment where students are competing against themselves may be more conducive for learning than an environment where students compete against each other. There is evidence to suggest that this direct competition, in the form of leadership boards for example, may create a stressful learning environment similar to ranking systems (Toda, Valle, and Isotani 2017). Our raffle ticket system avoided this direct competition, as we did not disclose to the entire class how many raffle tickets each student received in a given week. Thus, maintaining a balanced approach that encourages healthy

competition while promoting cooperation and community building is crucial for fostering a positive educational experience.

Implementation recommendations

In considering the integration of our raffle ticket system into classrooms, several key recommendations can guide effective implementation.

1. Set clear, measurable objectives for engagement and participation. Instructors should define what constitutes effective engagement, explaining the metrics in detail to allow for a thorough understanding of the expectations.
2. Design a reward system that is inclusive of all students, regardless of background, proficiency levels, or socioeconomic status. This might involve offering a variety of prizes that cater to different interests and needs, ensuring all students can find something motivating.
3. Activities that are more time-consuming, such as making an original post or providing formal feedback to a peer, might see greater student uptake if they are appropriately awarded more raffle tickets for these tasks than for simpler actions.
4. Provide reminders about the types of engagement on the LMS that would be awarded raffle tickets. Informal conversations with our students suggested the collaboration activities (i.e., providing peer feedback and kudos) were under-emphasized by the instructional team in comparison to posts, replies, and reactions.
5. Collect and implement feedback on the gamification strategy to ensure it remains effective, relevant, and cooperative. This may constitute the collection and analysis of student performance data to see if the gamification elements are positively impacting engagement. Additionally, it would be valuable to solicit direct student feedback during and after each course offering to identify areas for improvement. Adjustment based on feedback and data will allow instructors to refine the gamified system to better meet the needs of their students and the educational goals of the course.

Future research directions

Our findings on the use of a raffle ticket-based gamification system to enhance student LMS engagement present several promising avenues for further studies. These future directions aim to expand our understanding of the system's efficacy and to refine and optimize the application of gamification in educational settings.

Longitudinal studies

First, to better understand the long-term effects of our gamification system on student engagement and learning outcomes, longitudinal studies may assist in observing changes over academic semesters or years. For example, while we observed steady increases in engagement (i.e., posts, replies, reactions) over a seven week period (weeks 7–13), it would be interesting to see if this increase would be maintained over a longer duration, especially considering literature suggesting student interest in a gamification system decreases as perceived novelty declines (Garnett and Button 2018; Toda, Valle, and Isotani 2017). Such studies would provide insight into the sustainability of engagement increases and whether initial gains are maintained, increased, or diminished over time.

Diverse education contexts

Furthermore, expanding the raffle ticket system to reach a variety of education levels and settings, such as K–12 schools or professional development programs, could help determine how different contexts influence the intervention's effectiveness. We suspect our raffle ticket system likely

needs modification depending on the student body, as evidence suggests the demographic of a classroom has an impact on how successful a gamification strategy is. For example, individuals who play video games appear to be more likely to engage with gamification strategies than those who do not (Luo 2022). Although age appears to not have much impact on the effectiveness of gamification strategies, recent statistics also suggest that older individuals are less likely to play video games (Luo 2022; Pew Research Center 2017). Thus, the implementation of a gamification strategy, such as our raffle ticket system, may be more challenging for graduate and professional programs that typically have older students. Additionally, investigating the approach across disciplines might also uncover subject-specific benefits and challenges.

Comparative studies

Lastly, future studies could be controlled and comparative in nature, investigating the raffle ticket system in relation to other gamification and traditional engagement strategies. For instance, one could utilize a control group or multiple experimental groups to rigorously test the relative effectiveness of different approaches simultaneously. A more specific comparison might involve contrasting digital badge rewards versus physical rewards, assessing variables such as feasibility, cost, and motivational impact. These insights would help determine which type of reward system is more effective at sustaining long-term engagement and whether digital badges offer a cost-effective alternative to physical rewards without compromising motivational benefits. Additionally, another comparative study could explore the use of a currency-based system, where students earn points or tokens that can be exchanged directly for guaranteed prizes versus the uncertainty of a raffle ticket system. It would also be interesting to investigate whether revealing the specific prizes in advance might also assist in incentivizing students earlier on.

In conclusion, these future studies would provide valuable insights into how varying gamification strategies can be tailored to meet the specific needs of education programs, enhance student engagement, and optimize resource allocation.

CONCLUSION

This paper details a raffle ticket system that successfully engages students in an LMS, particularly in terms of peer-to-peer interactions. Although there are areas for improvement, including metrics tallying and encouraging students to engage in more time-demanding tasks, we hope this raffle ticket system provides educators with a framework that can be modified and adapted to motivate asynchronous interaction among their students. We end our paper with a quote from the student author who experienced the raffle ticket system:

> As previously taking this course in the fall 2023 semester, I can definitely say that the integration of the raffle system has drastically improved my engagement and participation in this course. It has always been difficult for me to communicate and engage on an LMS, but through this system, I was much more motivated and encouraged to engage with my peers due to the rewarding aspect of raffles and prizes. My personal urge in wanting to gain more raffle tickets introduced a fun environment with my peers, which contributed to us becoming more comfortable and enjoying the use of the LMS as a platform for communication and feedback. This raffle ticket system not only enhanced my quality of learning, but it also helped me foster great relationships and comfortability in communicating with my peers.

Thus, embedding a gamification system to encourage LMS engagement may not only benefit student performance in a course, but it may also help instructors build a community of belonging.

NOTES

1. The fall 2021 offering was held virtually during the COVID-19 pandemic, and the fall 2022 and 2023 offerings were held in-person.

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