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MOTIVATION, ENGAGEMENT, ENJOYMENT, AND LEARNING ACHIEVEMENT TOWARD GAMIFIED CLASSROOM VIA LEARNING MANAGEMENT SYSTEM TO ENHANCE LEARNING ATTITUDE

SITI NAZLEEN ABDUL RABU[1], NOOR HANIM ISMAIL[2], NUR IZZAH OSMAN[3], SITI KHADIJAH MOHAMAD[4]

[1, 2, 3]Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia, Pulau Pinang, Malaysia

[4]School of Distance Education, Universiti Sains Malaysia, Pulau Pinang, Malaysia

E-mail: [1]snazleen@usm.my, [2]faith_neem@yahoo.com, [3]izzahosman@student.usm.my, [4]sitikhadijahmohamad@usm.my

ABSTRACT

This study investigates postgraduate students' attitudes toward a gamified classroom approach. Sixteen Malaysian postgraduate students were involved in this study. A case study research design with quantitative and qualitative data was adopted through questionnaires, focus group interviews, and data log to explore students' motivation, engagement, enjoyment, and learning achievement, as well as their scoring and engagement profiling via the Schoology platform. The findings indicate that most of the students have a positive attitude toward the gamified classroom. Game mechanics, such as *Challenges, Team*, and *Leaderboard* helped to promote the success of the gamified classroom. Students enjoyed completing *Challenges* and agreed that the gamified classroom approach had improved their learning and perceptions of gamification. Gamified classroom was more enjoyable than the traditional classroom and had influenced students to be highly motivated and engaged in learning. Several suggestions to enhance students' attitude and engagement toward gamified classroom as well as its relation in the information technology perspectives are also described.

Keywords: *Gamification, Gamified Classroom, Attitudes, Motivation, Engagement, Enjoyment, Learning Achievement*

1. INTRODUCTION

In the current age of technology, the excessive use of modern gadgets, social media, personal interest, among others has resulted in learning distraction among students. This situation has imposed considerable challenges to educators in retaining students' focus on lessons. Thus, gamification is said to have the potential to overcome this issue by increasing students' motivation and engagement in learning [1], [2]. Ofosu-Ampong [3] defines gamification as "the use of game elements in a non-game context." Presently, gamification has acquired a major reputation among academics, practitioners, and business professionals in many diverse fields of background, such as education, information studies, human-computer interaction, and health [4]. In the educational context, there has been an increasing interest in the use of gamification to increase engagement [5], [6], [7], [8] and motivation [1], [7], [9], [10], [11], [12], and those findings are generally positive. However, empirical validation is limited to a small subset of possible contexts [7], [10], [13].

The systematic review conducted by [14] revealed that most gamification studies involved students at the university level, specifically undergraduates. This could be due to the convenience for college instructors to experiment and implement a gamification approach in their courses. They might also be better supported technically or have the necessary computer-related skills, which allowed them to implement a gamification approach in their classroom. Nevertheless, only one study involved postgraduate students [14], [15]. For generalisability purposes, it is good to have research that includes other matured demographic groups since the acceptance of the gamification approach may differ based on the maturity of students.

Currently, there is a lack of empirical research and standards of practice for the design and implementation of a gamified classroom with a deeper view of gamification, including theoretical foundations and standards for practice that require further study. Moreover, as stated by the [30] and [31], there is still no common understanding about a set of game elements that can be applied to gamify information technology systems and discipline. Besides the limitation of empirical research on gamification, the results from few empirical studies on various elements of gamification conducted in educational settings are also mixed [7]. The outcome of the empirical studies on gamification were also reported with inconclusive findings [14]. Such outcomes act as a hindrance to the progress in the area of educational gamification as well as information system, thus more research is needed to ascertain and validate the inconsistency. Apart from that, little, if any, studies that report about the design and implementation of game mechanics in a gamified classroom particularly at the postgraduate level although game mechanics is considered as a powerful tool for enhancing and promoting engagement, motivation, enjoyment, and learning achievement at higher education level. Moreover, various options of game mechanics that available makes it difficult for instructors to choose and implement the right approach to meet the needs of different players. Thus, there is a need for more studies to enhance our understanding of how game mechanics are linked to motivation, engagement, enjoyment, and learning achievement. The shortcoming of the literature also calls for further research to gauge whether gamification is suitable at the postgraduate level and appropriate to enhance their attitudes toward a gamified classroom. Apart from that, it is interesting also to note that many of the information technology systems that exist today which utilize gamification potential can provide value to organizations and people if individuals and communities actively engage in using them though it is hard to motivate to actively and continuously use such systems.

Due to the significance that this study will bring to the education sector as well as information technology in general, in-depth understanding of students' attitudes toward a gamified classroom is examined via three research questions as follows:

i. What are students' attitudes toward game mechanics and how do specific game mechanics affect their learning achievement in a gamified classroom?
ii. What are students' attitudes toward a gamified classroom in terms of motivation, engagement, enjoyment, and learning achievement?
iii. What are students' engagement and scoring profiling in a gamified classroom?

2. RESEARCH METHODOLOGY

A case study research design with quantitative and qualitative data was adopted to explore the impact of the design and implementation of game mechanics and gamified classroom on students' motivation, engagement, enjoyment, and learning achievement. The instruments used in this case study are questionnaire, interview and log data (course analytics and user analytics) form the Schoology platform. A descriptive and content analysis techniques were used in analysing the data collected.

A total of 16 first-semester postgraduate students in a well-known public university in the north region of Malaysia who registered for Instructional Design and Delivery course were involved in this case study. The students were recruited through a purposive sampling method. Purposive sampling is suitable to be used when researchers are interested in informants who have the best knowledge concerning the research topic [16]. Besides that, purposive sampling is appropriate for research involving the use of content analysis [16].

Sixteen students in groups of four were taught in a blended manner with the support of the Schoology learning management system (LMS) for a 15-week duration. Schoology LMS allows users to create, manage, and share content and resources. It enables a course instructor to manage his/her class systematically as the platform is visually familiar to Facebook and other well-known social networking websites. Through the Schoology platform, the instructor could control the gamified classroom as the platform is equipped with attendance records, online gradebook, tests, forums, badges, and quizzes. Schoology is also customized with advanced analytics, text message notifications, and a shared resource library in which the instructor can upload materials such as files, links, videos, and pages. The Schoology platform is available for iOS, Android, and Kindle devices.

Six *Challenges* were assigned in line with the lecture materials for the Instructional Design and Delivery course. This course introduces students to the varieties of instructional design theories and models from the objectivist and constructivist

perspectives. The instructor who taught this course was notified about the study and agreed to cooperate and gamify the dry theoretical-based course throughout the 15-week study, which will potentially improve the students' success in the course.

This study was conducted in three phases: (1) design of the gamified classroom, (2) implementation of the gamified classroom, and (3) data collection process. First, the researchers and instructor designed the intervention classroom using a theory based on the Mechanics, Dynamics and Aesthetics (MDA) framework by [17]. This framework was adapted and utilised to balance the gamification design.

i. Game mechanics:
   Six game mechanics, namely *Challenge, Team, Leaderboard, Badges, Level Points (LP)*, and *Experience Points (XP)* were applied in the gamified classroom.
ii. Game dynamics:
   Game dynamics refers to the reason behind the students' motivational behavior toward the game mechanics. The common game dynamics are rewards, status, self-expression, competition, and achievement.
iii. Aesthetics:
   Aesthetics is a desirable emotional response evoked in the player when he or she interacts with the game system that can enhance the desired goal or objective. Aesthetics comprise of:
   a. Sensation: game as sensory pleasure
   b. Fantasy: game as make-believe
   c. Narrative: game as drama
   d. Challenge: game as an obstacle course
   e. Fellowship: game as social framework
   f. Discovery: game as uncharted territory
   g. Expression: game as self-discovery
   h. Submission: game as a past time

In the second phase, the students were required to undergo a gamified classroom intervention. They were grouped into four teams of four students each, namely, Group A (GA), Group B (GB), Group C (G, C), and Group D (GD). The gamified classroom began with the first lecture, i.e. the course introduction to Instructional Design and Delivery. The instructor first assessed the students' prior knowledge on the course by letting them play Kahoots. The instructor then slowly introduced gamification to the students by explaining the learning concept of gamification, game mechanics, the Schoology platform, and the gamification grading system. Every lecture session was followed by one *Challenge* which were designed critically and creatively on the subject content, as the following:

i. Challenge 1: Paradigms, theories, and models of learning
ii. Challenge 2: Gagne's nine events of instruction from the topic on instructional design theories and models
iii. Challenge 3: Application of key principles of behaviourism from the topic of behaviourism learning theory
iv. Challenge 4: Application of key principles of cognitivism from the topic on cognitivism learning theory
v. Challenge 5: Application of key principles of constructivism from the topic on constructivism learning theory
vi. Challenge 6: Play Kahoot for the topic on evolution of learning theories

The *Teams* were given two weeks to complete each challenge. Students were required to answer all the *Challenges* tasks in team by posting it on online discussion forum of the Schoology platform. The instructor then assessed the students' postings in the forum manually and rewarded each team with scores. These scores were then calculated from the combination of *LP* and *XP*.

LP is the rewards given to the students based on their level of achievement. They will receive specific points once they completed each level as indicated in the Table 1.

Table 1: Five Level Points

Level	Points
5	10,000
4	8,000
3	6,000
2	4,000
1	2,000

XP refers to the extra points that students can earn by completing specific tasks given by the instructor (see Table 2). The value of these *XP*s was measured by how much the students achieved the tasks that are beyond their usual learning behaviour activity. As the rewards is basically depended on them, it is expected that the students might have a strong will to gain more *XP*.

Table 2: Experience Points

Experience Points (XP)	Criteria
Plus 10 XP	Frequent login/post

Experience Points (XP)	Criteria
Plus 30 XP	Helping another student with their work
Plus 50 XP	(Medium) active participation in group work
Plus 60 XP	Creative answer given (engage at high level of Bloom Taxonomy)
Plus 80 XP	(High) active participation in group work
Plus 100 XP	Early completion of the challenge
Minus 30 XP	No dynamic cooperation in group work

Students' *LP* and *XP* scores for each challenge they completed will be reflected on the *Leaderboard*. There are two types of leaderboards: *group leaderboards* and *individual leaderboards*. The *group leaderboards* scores were calculated from the combination of *LP* and *XP* based on the teams' efforts assessed through the *Challenges*. The *individual leaderboards* displayed outstanding or top students assessed based on their individual contributions and engagement, which were calculated from their individual *XP*s. The outstanding students will also be rewarded with *Badges*. Toward the end of the course, the instructor celebrated the team winner and top students in an award ceremony. See Figure 1 for the structure of the instructional design and delivery of the gamified classroom.

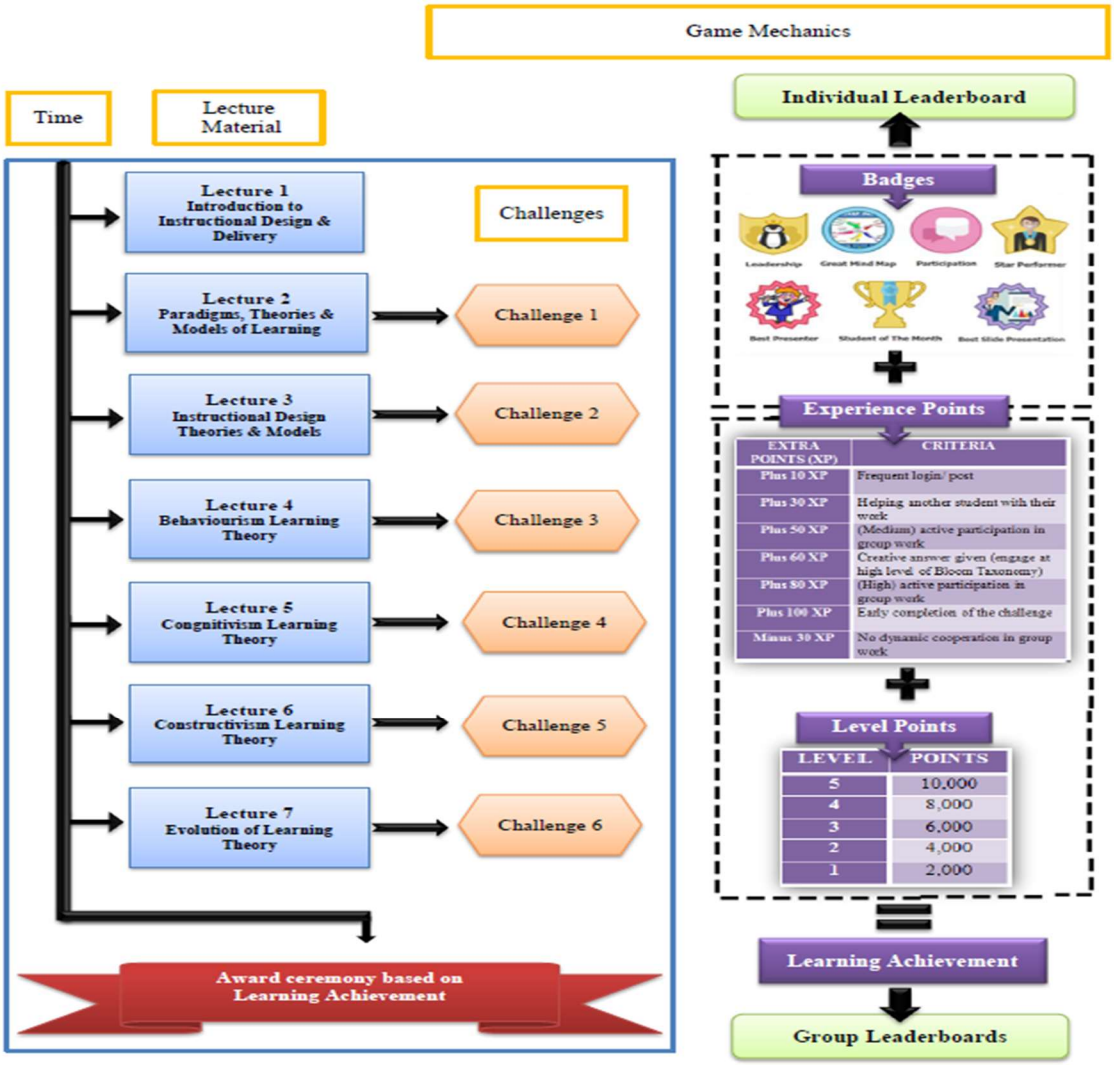

Figure 1: Structure of the Instructional Design and Delivery of the Gamified Classroom

In the third phase, appropriate instruments were administered to answer the research questions. First, two types of questionnaires were distributed to the students:

i. Instructional Materials Motivation Survey (IMMS) by [18]. This questionnaire consists of four elements: motivation, engagement, enjoyment, and learning achievement. The questionnaire was adapted and administered to determine the students' attitudes toward the gamified classroom in terms of motivation.
ii. A questionnaire which developed according to Model of Learner Engagement by [19] which consists of five learning engagement factors: challenge, control, immersion, interest, and purpose. This questionnaire is used to determine the students' attitudes toward the gamified classroom in terms of engagement.

Second, focus-group interviews were conducted to explore more complex understandings, perceptions, opinions, or experiences pertaining to students' attitudes and experiences toward the gamified classroom. The interviews were audio-recorded and brief notes were taken as a contingency measure. Probes were also used to obtain additional information from the participants, particularly from those who were hesitant to answer the interview questions. All interviews were then transcribed and coded into themes. The items were analysed and presented descriptively in a form of average mean.

Finally, data on students' activities were collected from course analytics and user analytics which includes students' total time in the course, number of posts, and number of *badges* as well as *challenges* scores and participation. These three types of data (i.e. questionnaires, interviews, and data log) were triangulated to enhance the credibility and validity of the findings [20].

3. RESEARCH FINDINGS

The participants' demographic data were collected before the interview session began. Sixteen postgraduate students consisting of eight female students and eight male students participated in the study. Most of them aged between 18 - 25 years old and 25 - 29 years old (5 participants respectively). Only three participants aged between 30 - 35 years old and 36 - 40 years old, respectively. Most of the participants reported only playing games once a month, and the other four of them played games once every couple of months. Four participants admitted to playing games weekly, and the remaining three participants have occupied themselves with games daily.

3.1 Students' Attitudes of Game Mechanics in Gamified Classroom

A descriptive analysis of the questionnaire responses showed that among the six game mechanics, *Team* received the highest result followed by *Challenge*. *Leaderboards, LP*, and *XP* meanwhile were not far behind, while *Badge*s was the least essential game mechanic. On the contrary, findings from the focus group interviews indicated that *Challenge* was the most preferable game mechanic in the gamified classroom. The students believed that *Challenge* was fun, interesting, and appealing since it had various difficulty levels. Moreover, some students mentioned that through *Challenges* they could compete with other teams and share their ideas with group members. As for *LP* and *XP,* the students agreed that these game mechanics are useful nevertheless, they did not bother to check their points.

3.2 Students' Attitudes toward Gamified Classroom

3.2.1 Students' attitudes toward gamified classroom in terms of motivation

All elements of ARCS Model of Motivation were present and high (see Figure 2). Satisfaction recorded the highest mean followed by Relevance. When asked about the game mechanics that motivated their learning, most of the students opted for *Challenges*. Nevertheless, one of the groups disclosed that their motivation decreased because of the increasing difficulty in *Challenges* tasks besides the needs to focus on other courses throughout the semester.

Figure 2: Overall Motivation

All participants agreed that learning in a gamified classroom helped them to actively

collaborate and interact in the learning process and become more productive. Some of the participants exhibited strong motivation throughout the implementation of the gamified classroom due to the intrinsic fear of losing. Group C in particular, expressed that they had to be active in the environment to prevent themselves from being at the bottom of the *Leaderboard*.

3.2.2 Students' attitudes toward gamified classroom in terms of engagement

The majority of the students rated *Challenges* as the most engaging game mechanic because the game tasks encouraged their active participation. The interview findings also indicate that their engagement level was high because they perceived the value of gamification as worthwhile. The students also agreed that they had spent more time engaging with the course and the materials in the gamified classroom as compared to other courses.

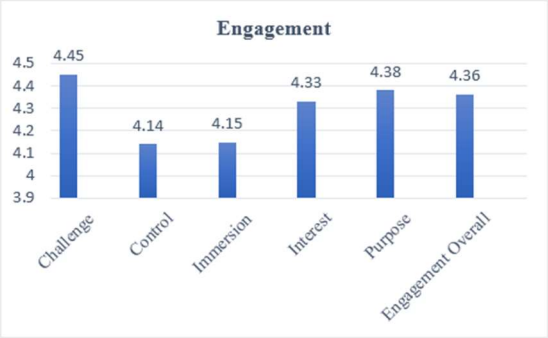

Figure 3: Overall Engagement

The participants were further questioned on their interaction in the gamified classroom through the Schoology platform. Most of the students acknowledged that the platform has attractive and friendly features, which enabled them to participate actively in the activities. Some of them even stated that the platform is similar to Facebook in terms of receiving notifications when someone posted in the discussion forum. These features encouraged them to utilise the platform and interact with their team members daily.

3.2.3 Students' attitudes toward gamified classroom in terms of enjoyment

An important effect of gamification is that the application should be enjoyable as it can lead to improved learning. Figure 4 sums up the enjoyment's result based on the given questionnaire with an overall mean of 4.52.

As for the game mechanics, *Team* received the highest mean score, followed by *Challenges*. *Badges* on the other hand is the least favoured of game mechanics that influences enjoyment.

Table 3 whereas shows that half of the participants rated the level of enjoyment for this gamified classroom as "very enjoyable" and another half rated as "enjoyable", thus suggesting that all of the students positively enjoyed the gamification approach.

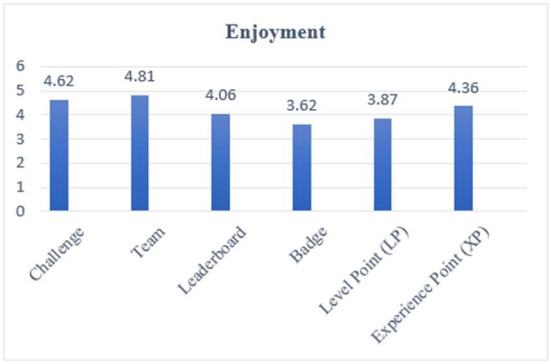

Figure 4: Enjoyment based on Game Mechanics

Table 3: Level of Enjoyment

Level	Percentage
Not Enjoyable at all	0%
Not Very Enjoyable	0%
Neither	0%
Enjoyable	50%
Very Enjoyable	50%

During the focus group interviews, some participants commented that the general structure of the course was interesting and enjoyable. They also noted that learning to use the gamification approach allowed them to be more focused and "awake" during the course. Some of the participants also agreed that gamification should be applied at the postgraduate level and not just for primary or secondary school students.

The participants were also asked to rate the difficulty level of the *Challenges* that they encountered in the gamified classroom. As shown in Table 4, the majority of them rated the difficulty level as in between moderate to hard.

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Table 4: Level of Difficulties in Challenges

Level	Percentage
Very Easy	0%
Easy	0%
Moderate	38%
Somewhat Hard	31%
Hard	31%
Very Hard	0%

3.2.4 Students' attitudes toward gamified classroom in terms of learning achievement

Most of the participants were aware about the learning achievement, which is a combination of *LP* and *XP* as explained by the instructor at the beginning of the class. The participants also were asked whether the opportunity to earn learning achievement motivated them to complete the *Challenges*. Most of them never thought about *LP* and *XP* while doing the *Challenges* and only focused on completing it. Only one group admitted that the opportunity to earn achievements in the course motivated them to accomplish the *Challenges*. To most of them, the 6 extra points in *XP* did not influence their behaviour in performing or accomplishing the *Challenges*.

Some of the students suggested adding more game mechanics such as rankings. After they achieved a certain level of performance, the instructor should reward them with rankings. For example, being ranked as either mayor, captain, or empress could ignite a student's excitement in the class. Another participant suggested rewarding well-known characters such as Yoda, Superheroes, or Minion once they win *Challenges*. Another student recommended using coupons as part of the rewards after completing and winning *Challenges*. He also mentioned that tangible rewards are more interesting; once a student achieves a certain number of coupons or stamps, he/she deserves tangible rewards.

3.3 Students' Engagement and Scoring Profiling in Gamified Classroom

The students' engagement and scoring profiling was obtained from user analytics in the Schoology platform where the gamified classroom was conducted. Table 5 displays the participants' profiling, which consists of two parts: individual engagement and challenges scoring.

Individual engagement consists of the participants' total time in the course, the number of posts, selected top students, and number of *badges*. The highest total time spent in the course was 84 hours by GA1, followed by GC2 and GC1 (30 hours and 29 hours, respectively). The rest of the participants spent their time in the course between 24 hours and 11 hours throughout the semester, and only three participants (GD4 and GB1) spent fewer than 10 hours. Regarding the number of posts, once again GA1 posted the highest number of posts in the discussion forums (85 posts), followed by GD1 and GB4 (72 posts), while GA2 posted 67 posts. While the majority posted between 20 to 30 posts, GC4 posted the least number of posts (11 posts) with the lowest time spent in the course (6 hours during the whole gamified classroom duration).

The students shall receive seven types of *Badges*, i.e. *great mind map badge*, *participant badge*, *leadership badge, student of the month badge, star performer badge, best slide presentation badge,* and *best presenter badge*. Not all participants received the rewards; only eight students succeeded in getting the *Badges.* The participant who received the most *Badges* was GA1. GB4 received five *Badges*, and GA2 GC1 each received four *Badges*. GD1 received three *Badges.* The rest of the GA members received two *Badges,* and GB1 only one *Badge*. GA being the only group that received the *great mind map badge* for their first in-class activity.

Six *Top Students* were selected by the instructor as active and hardworking participants who had delivered great performance throughout the semester. These students were also those that received *Badges* (GA1, GA2, GB1, GB4, GC1, and GD1).

The second part of the profiling was the challenges scoring (see Table 5). The scores were calculated from the combination of the *LP* and *XP* that the participants acquired from each challenge in the gamified classroom. The total number of *Challenges* in the whole semester were six, and GC won the first *Challenge* with a small difference of 30 points compared to GA. As for *Challenge 2* until *Challenge 5*, GA dominated the *Leaderboard*, except for the last *Challenge* in which GC defeated GA and became the winner once again. Regardless, the winner of the whole gamified classroom was GA as their combination points of *LP* and *XP* surpassed other groups' points. GC was in second place followed closely by GB, whereas GD finished last in the gamified classroom.

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Figure 5 summarised the findings of the study. *Challenges* was ranked the most impactful game mechanic that had boosted the students' motivation to participate in the gamified classroom. The boosted motivation also reflected the students' high level of learning engagement. The increment of engagement level was due to the students were aware about the purpose they have been involved in gamification especially in completing *Challenges.* Nevertheless, the *XP* and *LP* scores gained by completing *Challenges* did not influence the students' attitudes toward the gamified classroom. That indicates that the function of *Challenges'* feature in the gamified classroom was merely for fun. This feeling is much needed among matured learners for them to be more alert in a learning process rather than to intensely compete with other groups.

Table 5: Scoring and Engagement Profiling

Groups	Member	Individual Engagement				Challenge Scoring								Total
						Challenges						Learning Achievement		
		Total Time In Course	Number of Post	Top Student	Badges	C1	C2	C3	C4	C5	C6	Level Point (LP)	Experience Point (XP)	
Group A	GA1	84:47:07	85	/	7	8100	10320	10510	10510	10360	34095	82095	1800	83895
	GA2	20:28:29	67	/	4									
	GA3	16:37:09	34		2									
	GA4	16:11:53	44		2									
Group B	GB1	09:37:58	53	/	1	8060	8120	8280	10430	10280	21102	65102	1170	66272
	GB2	20:14:40	50											
	GB3	17:25:50	40											
	GB4	24:27:23	72	/	5									
Group C	GC1	29:37:59	22	/	4	8130	6070	6130	6010	8200	35142	69142	540	69682
	GC2	30:26:54	51											
	GC3	11:31:10	14											
	GC4	06:56:47	11											
Group D	GD1	18:23:29	72	/	3	6000	6060	6090	6010	6140	33419	63419	300	63719
	GD2	14:01:18	27											
	GD3	21:15:28	25											
	GD4	09:31:27	12											

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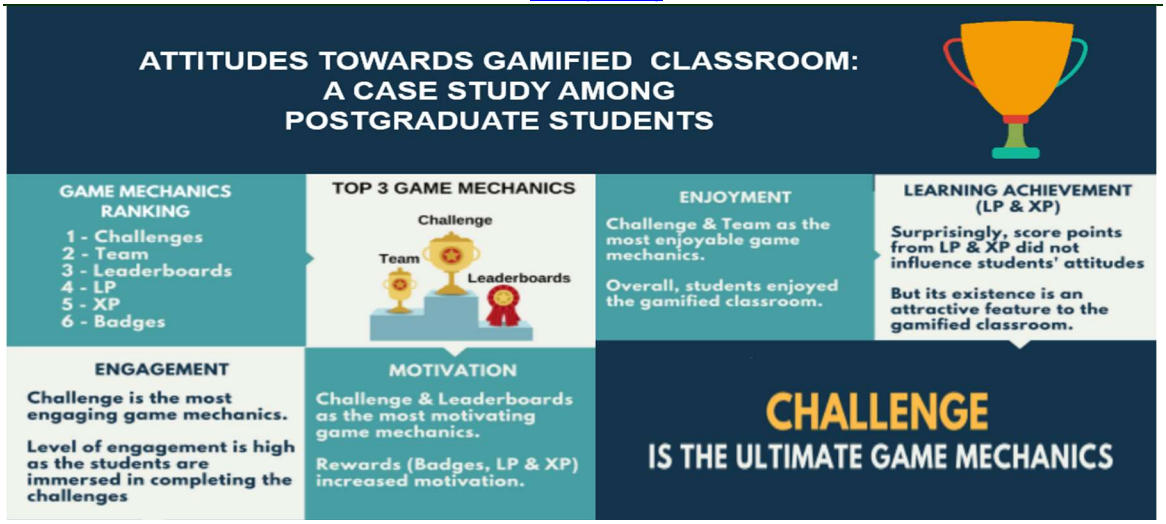

Figure 5: Summary of Students' Attitudes on Gamified Classroom

4. DISCUSSION

For the first research question, the students acknowledged that all the game mechanics used in the course were relevant to them, even at the postgraduate level. The results suggest that the most preferable game mechanics used in the gamified classroom were *Challenges* and *Team*. Students favored *Challenges* because it has the element of fun, interesting and appealing because it has a different level of difficulties. The *Challenge*s allow them to demonstrate their understanding by applying their higher-order thinking skills (HOTS) into their learning. *Team* also became their preference because they like to collaborate with other students and share responsibility and information. *Leaderboard*, and *Badges* were least favored as they caused harm to their motivation [21]. An example of a student's response is shown below:

> *Leaderboard was not my favorite game mechanic. If our group received higher points, then it motivates us. But if we received lower points from other teams, it will decrease our motivation. We don't have the drive or energy to push ourselves up the leaderboard once we were at the bottom. If we want to keep our motivation high, we have to make sure that we are the leading group. If the opposite happened, then we just let it be because we lost the momentum.*

Moreover, findings on game mechanics by [7] using rewards, badges, and other incentives to perform in class has a negative result and decreases intrinsic motivation as students feel more pressure and are more likely to drown under that pressure. Despite the drawback of the *Leaderboard*, it does not affect the majority of the students' motivation in this study as *Leaderboard, Badges,* including *LP* and *XP* are essential to game mechanics in a gamified classroom. This is aligned with [2] who believed that to gamify a course or classroom, it relies on the use of game mechanics because it increases interactivity, rewards, and motivation. Game mechanics allow students to have total control of the game levels and to guide their actions [22]. These game mechanics support assumptions that adult learners are often motivated as they have more experience and expertise during their previous life since they are mostly self-directed and expect learning to help with real-world problems [2].

For the second research question, in terms of motivation, the students acknowledged that gamified classroom contributes to satisfaction and is relevant for learning. The introduction of gamification to the students could have triggered their excitement and they admitted that gamification was something new to them. Another reason that they feel good about gamified classroom is due to *Challenges* are able to influence the students' motivation throughout the learning process. Nevertheless, a few of the students revealed that their motivation declined toward the end due to the increasing difficulty level in *Challenges* along with a commitment to other courses. One interviewee mentioned:

> *Yes… in some way, the rewards motivated us. But in the end, the motivation decreased because it's getting harder and at the same time, I have other courses to attend.*

The above finding aligns with the literature which indicates the negative effects of rewards on motivation. Decreasing intrinsic motivation, in particular, can affect students' final exam scores [7], [23]. However, the current findings showed that the significant decrease in the students' motivation was not because of the rewards, but rather because of the burden of other courses they were undertaking at the same time. Thus, it is important to take into account the basic psychological need satisfaction when developing gamified classroom [24] rather than design it for the sake of classroom activities so that can prevent gamification from losing its appeal.

In terms of engagement, the findings indicate a positive effect on the students' attitudes toward learning. Clear purpose of gamification in learning has influenced the students to be focused while performing the learning activities. According to [19], purpose is vital for adult learners as compared to children as they need to have clarity over what, why, and how they undertake certain approach as their learning strategy.

From the students' narrative, it is clear that the game mechanics in the gamified classroom, particularly *Challenges,* had encouraged them to be active participants in the new learning environment, thus increasing their engagement. One student reported:

> *We become more engaged because of the challenges. That's why we always concentrated on the challenges in this gamified classroom compared to other courses. Furthermore, if we didn't complete the challenges, we won't receive any points, and it was a continuous challenge.*

Although some students reported that *Challenges* could be a burden to them, the findings indicated that exposure to the *Challenges* in the gamified classroom could help them in the long run. To them, facing the difficulty during the gamified classroom was better than the burden of conventionally learning the whole syllabus for final exams:

> *It is more dynamic because it could be flexible on both sides. After we completed the challenges, and toward the final examination, it doesn't cause a lot of extensive remembering because we could relate to that challenge. For me, I call it dynamic learning. It was hard for me, but it could be used for the long term because we construct new knowledge. Previously, we only attend classes with no challenging activities and we didn't apply the understanding. Because of that we will forget about it easily. I prefer to understand the concept and answer the final examination questions based on my understanding and I am not keen on remembering and memorising. So, by having these chunking challenges, it helped me a lot.*

That finding resonates [25] who stated that by applying gamification elements to course work, greater creativity and engagement in the classroom can be promoted because students believe that they are a part of something greater than the course and it potentially increases their understanding and confidence. As the findings indicate, the highly engaged students were top students and group winners who demonstrated positive attitudes and feedback in terms of engagement. The students' engagement in behavioural and emotional dimensions were equally developed in the gamified classroom as they were actively participating in the activities such as forums and spent considerable time in the course. The engagement is also seen in the number of posts and discussion (which are part of engagement in behavioural dimension). Their hands-on experience is the best example of behavioral engagement. As for emotional engagement, the students' general feeling toward the gamified classroom can be gauged from their happiness, fun, interest, and how they value the learning:

> *Gamification is a good thing because it was fun, even adult like fun thing. I don't know that gamification can be applied to classroom and it was more fun and interesting.* (GA1)

> *It was fun in waiting for teams to be the leader in the class, engagement of other elements like teamwork also was exercised.* (GB3)

> *Yes, I can experience fun during the game and the level of engagement is high.* (GC1)*: Gamification makes things more interesting.* (GB4)

In terms of enjoyment, the students' gamified classroom experience was generally an enjoyable one. If the activities are too difficult for the students' skill level, they may become anxious or discouraged and eventually give up. However, if the activities are too easy for the students' skill level, they will be

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more likely to become bored and quit. The students described their experience as hard because the level of difficulty increased gradually after one another:

> *At first, it was okay. The challenge was not difficult, but as we approached the final challenge, it became harder.*

Enjoyment is another important element that can lead to learning improvement. Thus, gamification has the potential to foster students' engagement and motivation [5]. With gamification, there is a high possibility for students to be part of "a game" and they could enjoy themselves as well as improve their learning achievement [26], [27]. The finding indicates that gamification promotes enjoyment which caused students to be more focused and active as it brings the element of freshness and excitement to the learning process that boost up students' engagement together with motivation. One student responded:

> *To me it was fun. It was because in other courses, although the class was for 2 hours long, I felt bored and tired. But when we apply gamification, we engaged ourselves so we will not feel that bored, and the time felt short in this class where 2 hours become 30 minutes.*

Since students' satisfaction is also a part of enjoyment according to the flow theory, students could be said as enjoying the gamified classroom when they experience satisfaction and are at the peak of creativity and performance during the flow [28]. In the case of those in the current study, their satisfaction can be described as feeling like a newborn after successfully completing a task. Some of them noted the feeling akin to relieved because they were at the end of a journey. They were pleased, excited, and satisfied that they could finish the tasks and learn something new and meaningful.

In terms of learning achievement, [29] study has proven that the use of *Experience Points (XP)* can be very effective in learning. However, the current study found that learning achievement was not the postgraduate students' priority as they focused only on completing their tasks. Thus, *LP* and *XP* are not the factors that influenced their learning achievement in the gamified classroom. One possible reason is that the students are adult learners with high intrinsic motivation to achieve the ultimate learning goal, which is to master the learning content. Hence, they were not concerned with the score points as the *LP* and *XP* were designed as extrinsic motivation elements in the gamified classroom. Nevertheless, the presence of *LP* and *XP* was necessary to add interactivity to the gamified classroom. Without these mechanics, the classroom could not be gamified:

> *The learning achievement was not our main concern as we understand the learning goals. Nevertheless, it adds the interactivity element actually and we can feel the class was gamified. If there is no learning achievement, then it's not considered as gamified classroom, right?*

The presence of *XP* added attractiveness to the gamified classroom as it required the students to perform optional work that will give them bonus credit. *XP* also served as an instant pleasure for students who accomplished the unexpected behaviour, which had an astounding effect that granted the students with *XP,* for example, helping other teams without considering that they were competing with each other. *XP* should be given for constructive involvement in the online forum to strengthen class unity and support:

> *We are not aware of 6 points and it does not influence us, but it's a good thing to have. I agree that the extra points add a bit of attractiveness and whoever receives it will make the group different from another group as it was not an easy thing to get.*

For the third research question, Group A beats other teams, as their motivation was their major drive that influenced their attitude. Group A admitted that the rewards were not their priority, but they focused more on completing the *Challenges*. Receiving the rewards boosted their motivation, and they wanted to stay on top of the game. Additionally, Group A constantly observed the *Leaderboard* to ensure that they were not dethroned by other teams. Group A was also the only team that received *Badges*. Despite the team members' commitment (such as work and family), they were dedicated to engaging in the gamified classroom where they could utilise online communication to communicate with each other and complete the *Challenges* earlier than the due date given by the instructor. Correspondingly, [10] note that motivated students are more likely to be engaged in learning activities and to display enhanced performance and diligence. Other teams also admitted to their tendency to spy on Group A's discussion forum to get a better insight into the latter's performance in all the *Challenges.* One team member from Group D even joined the

Group A' discussion forum to participate in the discussion. The team members reflected on the *Challenges* as fun and interesting; they did not find the game a burden since they were used to dealing with more demanding and challenging situations at their workplace.

The lowest points in the gamified classroom belonged to Group D (63,719 points). The team also received the lowest *XP* with 300 points. The motivation level in this group was conflicting, as one student felt that the rewards did not influence his/her motivation. Their collaboration was also not satisfactory as they felt they were forced to do the *Challenges*. This finding is consistent with [7] who noted that students might feel pressured in a gamified classroom. The attitude could be attributed to the lack of cooperation among the team members as they were unenthusiastic to spend time completing the *Challenges*. The teamwork in this group was not coordinated, and it was hard for them to achieve the learning goal without the team spirit. Group C, who was the first runner-up, also found the tasks got harder, hence decreasing their motivation to complete the tasks. This finding seems to accord with previous studies on game mechanics (competitive context, *Badges*, and *Leaderboard*), which demonstrated that decreased intrinsic motivation may harm some educational outcomes [7]. Group C was the only team that preferred face-to-face interaction to the gamified classroom as they needed to be more active when meeting after the class.

5. CONCLUSION

First, game mechanics i.e. *Challenge*, *Team*, and *Leaderboard* were found to strongly influence the students' attitudes in the gamified classroom, with *Challenge* was found to be the students' most preferable game mechanic. Second, most of the students felt that the gamified classroom had increased their motivation. Nevertheless, the increasing difficulty specifically in *Challenges* tasks has somehow affected their motivation in a negative way. Third, students' level of engagement is high because they were immersed in completing the *Challenges* and that their active participation showcased their behavioural engagement. Fourth, the students' overall attitudes are affirmative, and the *Team* game mechanics were found to also make them enjoy the gamified classroom. Fifth, learning achievement was important to the students in the gamified classroom. The use of certain game mechanics such as *Challenges, Teams, Badges, Leaderboard*, *LP*, and *XP* in a gamified classroom could foster their positive attitudes toward achieving the learning objective of a particular course in a fun and interesting way. Lastly, students' engagement and scoring profiling are better when their attitudes have been influenced by their positive motivation. *Challenges, Rewards, Badges* and *Leaderboard* were constantly used and observed by this group of students although *Rewards* were not seen by them as a priority, but completing the *Challenges*. On the contrary, poor engagement and scoring are basically influenced by conflicting motivation, lack cooperation and uncoordinated team spirit, and feeling being pressured or forced to complete the gamification learning tasks. Therefore, instructors should be attentive in designing and utilising the game mechanics in the gamified classroom as they may backfire and harm students. The implementation of gamified classrooms that incorporated specific game mechanics can establish a meaningful learning experience for the students and fulfil their learning needs. We also believe that the findings of the gamified classroom also give a good overview on the information technology research area that discuss game design elements and attitude of users in adopting gamification in their practices.

6. IMPLICATIONS OF THE FINDINGS

Although the current study is based on a small sample of participants, the findings offer several implications.

i. Since students selected *Challenge*, *Team*, and *Leaderboard* as their main game mechanics preferences, instructors can be more creative in utilising *Challenges* that aligns with the learning objectives and apply high order thinking skills. The *Challenges* should also be designed in accordance with the students' backgrounds and the type of players they are. Future research may want to first identify students' characteristics or player types at the beginning of a course session.
ii. There is a need for instructors to include *Team* as part of the game mechanics in a gamified classroom as it has been proven to be one of the major factors of motivation and engagement.
iii. It is important for instructors to infuse fun into learning even at the postgraduate level. Fostering enjoyment through gamification while learning will not only enhance students' engagement, but also motivation. This finding may help future instructors to create a more efficient gamification learning environment that

enables students to experience fun and willing to participate.

iv. A range of game mechanics appeared to receive more attention than others, such as *Challenge*, *Team* and *Learderboard.* Future studies may consider other game mechanics to be used, such as *Ranking* or other tangible rewards (e.g., coupons or gifts).

v. This study also calls for future research to identify students' characteristics or player types and incorporate them into a gamified classroom at the beginning of a course session. Such a study will enable the identification of students' individual preferences based on their type of player.

vi. Future research may consider tackling the issues inherent in online and flipped gamified classrooms since the influences of online and flipped learning approaches combined with gamification have not much been explored. The influence of these complex combinations on students' attitudes and performance can be explored further.

7. LIMITATIONS OF THE STUDIES AND RECOMMENDATION FOR FUTURE RESEARCH

There are several limitations of this study and that include the population and sample of students in the study. This study only focused specifically on 16 postgraduate students of the Master in Instructional Multimedia and Technology who enrolled in instructional design and delivery course. Therefore, future research should consider other courses from other disciplines, so that the effect of gamified classroom can be generalized widely on the population it represented.

In addition, the researchers also applied flipped learning and blended learning in the gamified classroom due to the nature of the course. Nevertheless, due to limited time, the researchers only concentrated on the gamification approach during the analysis process. Hence, future research may explore the influence of flipped and blended learning in the implementation of this gamified classroom for better understanding of the complexity of gamification in learning process.

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