

# The Effectiveness of Gamification through Classroom Leaderboards for Student Engagement

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**Abstract:** Universities, researchers and practitioners are looking for effective ways to engage, enhance, and promote students' learning in the classroom. Gamification is the integration of game-like design elements into non-game context to motivate action, engage, and solve problems. This paper presents the effectiveness of gamification through leaderboards to improve student engagement in subjects for Company Website Design (EIC552) and Communication through Drama (EPE530) at Akademi Pengajian Bahasa, Universiti Teknologi MARA. Questionnaires were given to examine the effects of gamification on student learning and engagement. Results suggest that gamification through leaderboards are effective in improving student participation and encouraging extracurricular learning.

Keywords: Gamification, Technology, Learner Engagement, 21st Century Learning

## 1. Introduction

Teaching and learning is a process that sees the transfer of knowledge from the teacher to the learner. To do this effectively, there are principles that would commonly guide the process. Tiberius and Tipping (1990) have lined up 12 principles which begin with the teacher's knowledge of the subject matter to conduct the teaching. This is followed by principles such as the student's active involvement which enhances the learning, interaction between the teacher and the students, students taking charge of their own learning, diversifying the approaches to learning, establishing an atmosphere of cooperation and collaboration of ideas, as well as making the material meaningful and getting feedback for both the teacher and learners. These principles suggest that effective teaching and learning requires active and interactive participation in which the teacher uses their knowledge and skills to come up with engaging lessons that would induce learning and responses. Hence, student engagement is the key and goal in teaching and learning.

Student engagement according to Astin (1984) is how much energy is put into the academic experience by the student, both physically and psychologically (cited in Ablia & Fraumeni, 2019). In relation to the previously mentioned principles of effective teaching and learning, this definition of student engagement also needs to include the teacher's crucial roles in determining appropriate content which will spur student engagement. In teaching and learning student engagement is vital as the teacher looks for affirmation that the student is 'learning'. A common belief is that a student successfully learns or learns better if they show that they are interested or enjoyed the lesson, or just appeared to be more immersed in the lesson. Marks (2000, cited in Ablia and Fraumeni, 2019) has observed that the likelihood of students learning, finding school experience rewarding apart from being likely to finish school and

pursuing higher education, are closely related to their engagement with school. In short, it is believed that student engagement is vital and searching for the best approaches to deliver the lesson is what a teacher strives for.

With the recent global pandemic, the need for more effective teaching and learning via online platforms has never been so pressing. Learning institutions from preschool to tertiary levels have adjusted and adapted their teaching syllabus to suit the unprecedented situation as well as to prepare for similar circumstances. Online teaching and learning is the most suitable means to ensure that education does not stop just because students are no longer in a physical classroom together with the teacher.

## **2. Statement of problem**

With the increase of wide-ranging online platforms to use in teaching and learning, educators may be spoilt for choice but there are significant concerns. Among them are issues such as merely adapting and utilising practices that are originally for face-to-face into online context or ‘one size fits all’ as claimed by Gillett-Swan (2017). Furthermore, during the earlier stage of the Covid-19 pandemic and mandatory government-sanctioned ruling to stay home, internet connectivity was also a major issue in certain areas in Malaysia as well as issues on online learning apprehensions among university students as found in a study by Nur Salina et al (2020).

These online learning issues are mostly still relevant as situations may not have improved much. However, it is also critical to delve into how students learn and respond to learning via the online method. The popularity of virtual or remote learning as a response to the Covid-19 crisis has also brought up questions on how involved and how engaged students are during online lessons. In relation to the issue, Gray and DiLoreto (2016) said that the sense of being disengaged to classmates and instructors is one of the challenges of online learning. The authors further mentioned the necessity of having pedagogical strategies for course delivery to ensure as much as possible opportunities to learn and be engaged in the online classes.

Gamification may not be a new approach in the learning environment, but its concept continues to be relevant in ensuring a fun and interactive learning. This method of learning is now even more applicable with online learning to encourage learner engagement. Therefore, the study hopes to investigate matters pertaining to the use and effectiveness of Gamification through Classroom Leaderboards for student engagement based on the following research questions:

RQ 1: What are the students’ perceptions of classroom gamification?

RQ2: How does gamification through classroom leaderboards create online engagement for the students?

## **3. Literature Review**

### **3.1 Gamification in educational setting**

The concept of gamification in education is gaining attention as an area of study in recent years. Research described gamification as the application of gaming mechanics and infusing them into non-gaming scenarios (Hanus & Fox, 2015). Gamification in education as explained by AL-Azawi et al. (2016), is when elements, structures and principles of gamification are used in educational settings. They further explained that gamification in education is achievable and affordable as compared to other educational methods; problem-based learning and learner-centered learning; because it encourages students to take up challenges without fear of failure. In a learning context, this could involve adding points, badges, and leaderboards to the institution’s learning management system LMS or classroom (Koivisto & Hamari, 2019; Majuri, Koivisto, & Hamari, 2018; Seaborn & Fels, 2015; Hamari et al., 2014). The aim of points, badges and leaderboards is to promote engagement and fun learning experience among students (Deterding, Nicke, O’Hara & Dixon, 2011 and Gamification, 2010) and was perceived that the badges they collected highlight their social status to their peers (Hamari, 2015). A study conducted showed that gamification concepts with badges and progress bars were used as a tool for online

learning. The study by Bovermann, Weidlich and Bastiaens (2018) mentioned that badges were used for direct feedback and recognitions on the students' effort and at the same time foster motivation for ODL and progress bars were used as a way to manage their studies and monitor their mastery in an online environment.

### 3.2 Leaderboard as a gamification tool

Leaderboard is one of the design elements of gamification, with the aim to improve productivity, engagement and learning. The simplest form of leaderboard displays a high score list, and ranks users according to their relative achievements, measuring against their peers through certain criteria (Christy & Fox 2014; Butler, 2013). The two types of leaderboards used are called 'absolute' and 'relative', where absolute displays cover all content for all users, including the users' scores and their details, which makes top users feel a sense of accomplishment as compared to the latter type; where it ranks users below and above them, making the latter type less meaningful (Ortiz-Rojas, Chiluzia & Valcke, 2019). When used in an educational setting, students can use their position on the leaderboard and assess their own performance with respect to their peers in the classroom.

### 3.3 Students Engagement

Through leaderboards, the classroom community benefits through social exchange and competition thus facilitating social interactions (Kim et al. 2018).

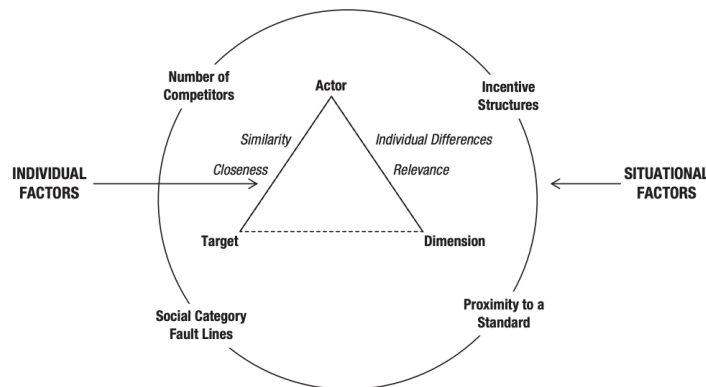


Fig 1: The Social Comparison Model of Competition (Garcia, et. al., 2013)

Students understand their abilities (behaviours, opinions, status and success) better and have a better assessment of themselves when they see how they are being compared to others. Leaderboards provide the means for students to compare themselves, where it motivates them to explore, engage in activities so they 'be on top', because it provides them with a sense of accomplishment and status (Ortiz-Rojas et al, 2019; Garcia, Tor And Schiff, 2013). Motivation is a fundamental element of students' learning, and it is a "process whereby goal directed activity is instigated and sustained" (Valerio, 2012). According to Self-Determination Theory (SDT), there are two types of motivation affordance in gamification; extrinsic and intrinsic motivation (Ryan & Deci, 2000). Intrinsic motivation, associated with student engagement, is where students "play, explore and engage in activities for the inherent fun, challenge and excitement of doing so" (Niemic & Ryan, 2009). Positive human tendency to move towards growth is the intrinsic motivation in this context, and is facilitated through three core needs; autonomy, competence and relatedness (Ortiz-Rojas et al, 2019; Ryan & Deci, 2000).

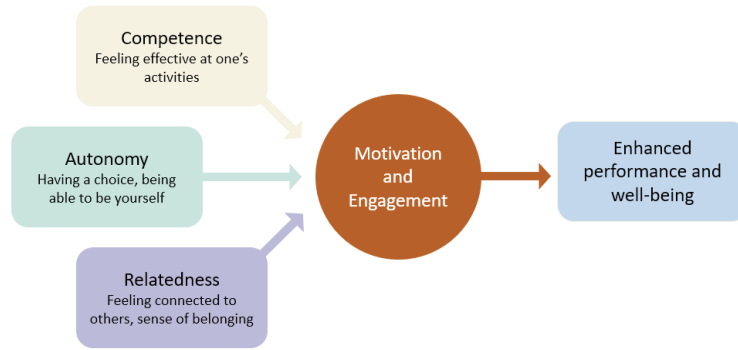


Fig 2: Self-Determination Theory (Ryan & Deci, 2000)

In a gamified setting, autonomy happens when players choose what activities they want to carry out (Werbach & Hunter, 2012), thus giving them the choice to chart their own path or intentions. Competence is defined as abilities, proficiencies, or skills that are necessary to reach a specific goal (Smelser & Baltes, 2001). With the gaming mechanics found in leaderboards, immediate feedback is given through students' scores or ranking based on the activities' results (Sailer et al, 2017; Aparicio et al, 2012). These game mechanics in leaderboards support intrinsic motivation, students' perception of information and mastery of knowledge and skills (Mekler, et al 2017). According to Ryan and Deci (2000), relatedness refers to the sense of connection with others; where students see the performance of one another classmates, compare and share progress and discuss positions (Shi & Cristen, 2016; Sailer et al, 2013). These three elements are important for understanding the what (content) and why (process) of goal-directed behavior and must be present for effective gamification strategies (Ryan & Deci, 2000).

#### 4. Method

This study involved 34 semester 4 and semester 5 students of Bachelor of Applied Language Studies (Hons.) English for Intercultural Communication program, from the Akademi Pengajian Bahasa, Universiti Teknologi MARA, who attended classes for 14 weeks.

The online questionnaire was adapted and developed from the Technology Acceptance Model (TAM) by Davis et al. (1989) and items proposed in the Student Course Engagement Questionnaire (SCEQ) by Handelsman et al. (2005), to measure students' engagement. TAM is an information system model that theorizes the process of acceptance and the usage of technology where users' decision to accept and use a new technology (A) relies on these two major factors; perceived usefulness (PU) and perceived ease of use (PEOU). The questionnaire consisted of four sections; (i) Perceived Usefulness (PU), (ii) Perceived Ease Of Use (PEOU), (iii) Attitude towards gamification (A) and (iv) Student Engagement (SE); with 21 likert-scale items: strongly agree (SA), agree (A), undecided (UD), disagree (D) and strongly disagree (SD).

The reliability of the constructs used in the instrument was tested using SPSS based on the 34 responses. The internal consistency of the instruments was measured using Cronbach's alpha and the results showed an acceptable value of above 0.7 thresholds for all constructs as shown in Table 4.2 .

Table 1. Cronbach alpha reliability measurement scales

| Construct/ Variables         | Cronbach's Alpha | N of Items |
|------------------------------|------------------|------------|
| Perceived Usefulness (PU)    | 0.931            | 4          |
| Perceived Ease Of Use (PEOU) | 0.827            | 5          |

|                         |       |   |
|-------------------------|-------|---|
| Attitude (A)            | 0.922 | 4 |
| Skill Engagement (SKE)  | 0.924 | 8 |
| Student Engagement (SE) | 0.924 | 5 |

The classroom leaderboards lasted 14 weeks and were designed, developed and implemented for both classes, EIC552 (Company Website Design) and EPE530 (Communication through Drama), in the context of regular courses. In order to support progress, mastery and recognition, progress bars, points, and challenges were chosen as gaming elements as these features were expected to lead to learner engagement, motivation and interaction (Hakulinen et al, 2015; Utomo & Santoso, 2015; Werbach & Hunter, 2012).

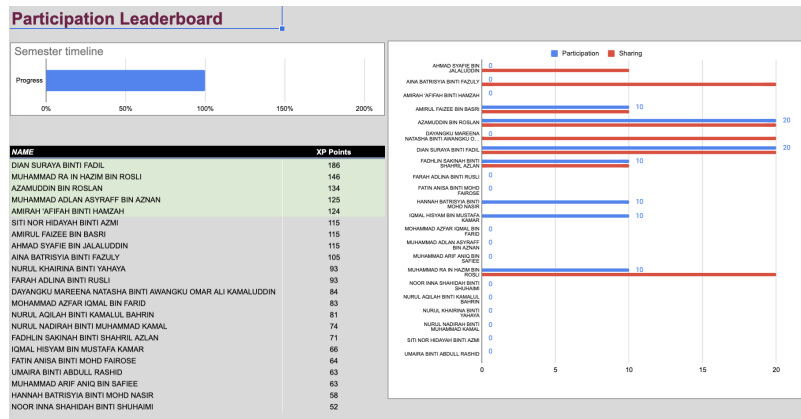


Figure 3: Classroom leaderboard that shows progress bars and XP points collected

The students were briefed about the classroom leaderboard early in the semester about ways for collecting and redeeming XP points. The progress bars were visible for everyone in the classroom and were matched to the amount of participation and contribution from the live-class or Google Classrooms, thus indicating evidence of engagement as shown in Fig. 3.

| STUDENT ID | NAME       | Sharing  |     |                     |            |    |    |    |    |    |    |    |    |    |     | Weekly Challenges |     |     |     |               |    |    |    |    |    |    |    |    |    | Assignments |     |     | Events |     |          |    | TOTAL |    |    |                   |     |     |     |     |
|------------|------------|--|-----|---------------------|------------|----|----|----|----|----|----|----|----|----|-----|-------------------|-----|-----|-----|---------------|----|----|----|----|----|----|----|----|----|-------------|-----|-----|--------|-----|----------|----|-------|----|----|-------------------|-----|-----|-----|-----|
|            |            | W13  | W14 | Total Participation | Progress % | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11               | W12 | W13 | W14 | Total Sharing | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10         | W11 | W12 | W13    | W14 | Total WC | A1 |       | A2 | A3 | Total Assessments | E1  | E2  | E3  | E4  |
| 1          | 201948406  | AHMAD SYAFIE BIN JALALUDDIN                                | 0   | 10                  | 10         |    |    |    |    |    |    |    |    |    |     |                   |     |     | 20  | 10            | 10 |    |    |    |    |    |    |    |    |             |     |     |        |     | 20       | 10 | 10    | 20 | 20 | 20                | 40  | 25  | 115 |     |
| 2          | 201989038  | AINA BATRISYA BINTI FAZULY                                 | 0   | 10                  | 10         |    |    |    |    |    |    |    |    |    |     |                   |     |     | 40  | 10            | 10 |    |    |    |    |    |    |    |    |             |     |     |        |     | 40       | 10 | 10    |    |    |                   |     | 0   | 35  | 105 |
| 3          | 2019488748 | AMIRAH AFIYAH BINTI HAMZAH                                 | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 40  | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        |     | 40       | 10 | 10    | 20 | 20 | 40                | 34  | 124 |     |     |
| 4          | 2019615258 | AMIRUL FAUZE BIN BASRI                                     | 10  |                     |            | 10 |    |    |    |    |    |    |    |    |     |                   |     |     | 10  | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 30  |          |    | 0     | 20 | 20 | 40                | 25  | 115 |     |     |
| 5          | 2019614764 | AZAMUDDIN BIN ROSLAN                                       | 20  |                     |            | 10 | 10 |    |    |    |    |    |    |    |     |                   |     |     | 20  | 10            | 10 |    | 10 |    |    |    |    |    |    |             |     |     |        | 30  |          |    | 0     | 20 | 20 | 40                | 24  | 134 |     |     |
| 6          | 2019482134 | DAYANGKU MAREENA NATASHA BINTI AWANGKU OMAR ALI KAMALUDDIN | 0   |                     |            | 10 | 10 |    |    |    |    |    |    |    |     |                   |     |     | 20  | 10            | 10 |    |    |    |    |    |    |    |    |             |     |     |        | 20  | 10       | 10 | 10    | 20 | 20 | 40                | 34  | 84  |     |     |
| 7          | 201989038  | DIANI SURAYA BINTI FADIL                                   | 20  |                     |            | 10 |    |    |    |    |    |    |    |    |     |                   |     |     | 20  | 10            | 10 |    |    |    |    |    |    |    |    |             |     |     |        | 50  | 10       | 10 | 20    | 20 | 20 | 40                | 36  | 186 |     |     |
| 8          | 2019890384 | FADHLIN SAKINAH BINTI SHAHRI AZLAN                         | 10  |                     |            | 10 |    |    |    |    |    |    |    |    |     |                   |     |     | 10  | 10            | 10 |    |    |    |    |    |    |    |    |             |     |     |        | 10  | 10       | 10 | 20    | 20 | 20 | 40                | 21  | 71  |     |     |
| 9          | 2019482454 | FARAH ADLINA BINTI RUSLI                                   | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 40  | 10       | 10 | 10    | 20 | 20 | 20                | 23  | 93  |     |     |
| 10         | 2019614738 | FATMA ANISA BINTI MOHD FAIROSE                             | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 40  | 10       | 10 | 10    | 20 | 20 | 20                | 24  | 64  |     |     |
| 11         | 2019481908 | HANNAH BATRISYA BINTI MOHD NASIR                           | 10  |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   |               |    |    | 10 |    |    |    |    |    |    |             |     |     |        | 10  |          |    | 0     | 20 | 20 | 20                | 18  | 58  |     |     |
| 12         | 201989038  | IQMAL HISYAM BIN MUSTAFA KAMAR                             | 10  |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   |               |    |    |    |    |    |    |    |    |    |             |     |     |        | 10  |          |    | 0     | 20 | 20 | 20                | 26  | 66  |     |     |
| 13         | 2019488556 | MUHAMMAD AZFAR IQMAL BIN FARID                             | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 30  | 0        |    | 0     | 20 | 20 | 20                | 33  | 83  |     |     |
| 14         | 2019488204 | MUHAMMAD AZLAN ASYIAFF BIN AZNAN                           | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 30  | 10       | 10 | 20    | 20 | 20 | 40                | 35  | 125 |     |     |
| 15         | 2019482524 | MUHAMMAD ARIFF ANIQ BIN SAFIEE                             | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 30  | 0        |    | 0     | 20 | 20 | 40                | 33  | 63  |     |     |
| 16         | 2019890356 | MUHAMMAD RA IN HAZIM BIN ROSLI                             | 10  |                     |            |    | 10 |    |    |    |    |    |    |    |     |                   |     |     | 20  | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 40  | 10       | 10 | 20    | 20 | 20 | 36                | 146 |     |     |     |
| 17         | 2019890344 | NOOR INAA SHAHDAH BINTI SHUHAMI                            | 0   |                     |            |    | 10 | 10 |    |    |    |    |    |    |     |                   |     |     | 0   |               |    |    |    |    |    |    |    |    |    |             |     |     |        | 10  |          |    | 0     | 20 | 20 | 20                | 22  | 52  |     |     |
| 18         | 2019294008 | NURUL AZLAH BINTI KAMALU BAHIRIN                           | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 20  | 10       | 10 | 20    | 20 | 20 | 31                | 81  |     |     |     |
| 19         | 2019486458 | NURUL KHARRINA BINTI YAHAYA                                | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 40  | 10       | 10 | 20    | 20 | 20 | 33                | 93  |     |     |     |
| 20         | 2019294044 | NURUL NADIRAH BINTI MUHAMMAD KAMAL                         | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 20  | 10       | 10 | 20    | 20 | 20 | 24                | 74  |     |     |     |
| 21         | 2019294038 | SITI NOR HIDAYAH BINTI AZMI                                | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 50  | 10       | 10 | 20    | 20 | 20 | 25                | 115 |     |     |     |
| 22         | 2019293882 | UMAIRA BINTI ABDULL RASHID                                 | 0   |                     |            |    |    |    |    |    |    |    |    |    |     |                   |     |     | 0   | 10            | 10 | 10 |    |    |    |    |    |    |    |             |     |     |        | 30  | 10       | 10 | 10    | 20 | 20 | 20                | 23  | 63  |     |     |

Figure 4: Various gamification features incorporated in the classroom leaderboard

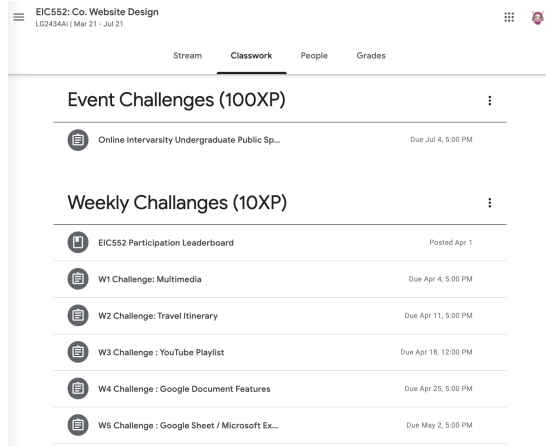


Figure 5: Optional activities to collect XP Points.

Gaming elements, such as points, badges, missions or challenges are widely used in educational settings. Because learning is a difficult process that requires motivation and persistence, most gamification platforms use these elements to keep the learners interested and motivated all the time. Missions or challenges work as powerful motivators for learners as these game elements are able to make the learning process more exciting, and dynamic. To encourage participation, it is a good idea to use a reward system to keep learners motivated. For the leaderboard, the awarding of XP points were given for the completion of various tasks and activities within the 14 weeks; from live-class participation, perfect attendance, completing weekly challenges, and other activities outside of the classrooms endorsed by the instructor (see **Fig. 4**). These activities, although optional, were encouraged to complete. The compulsory activities did not contribute to getting XP points, however, any late submission would result in XP points penalty. The optional and compulsory activities were both posted on Google Classroom, but both activities were placed in different headings (ie: Challenges or Course Work) (see **Fig. 5**).

| How to earn XP points?   | XP   |
|--|------|
| Ask questions in class that helps moves forward the learning outcome | 5    |
| Share insightful comments that adds depth & substance to the topics  | 10   |
| Submit assignments early   | 10   |
| Weekly challenges  | 10   |
| Participate in organised events                                      | 20   |
| Group Dynamics (perfect ratings)                                     | 30   |
| Perfect attendance (attend webex early & sign attendance GC on time) | 30   |
| Certification  | 20   |
| Late Submissions   | -10  |
| <b>XP STORE</b>  |      |
| Deadline Extension of graded assignments/ assessments                | -150 |
| Retake graded assignment/ assessment                                 | -250 |

Figure 6: Ways XP points can be collected and redeemed

Learners were allowed to redeem their XP points on deadline extensions or retake assessments provided they have enough XP points to redeem (see **Fig. 6**). At the end of the 14 weeks, the top 5 XP scorers were rewarded by their instructors.

## 5. Results

Table 4. Results for Attitude towards Classroom leaderboards

| <b>ATTITUDE (A)</b>   | <b>SA</b> | <b>A</b> | <b>UD</b> | <b>D</b> | <b>SD</b> |
|---|-----------|----------|-----------|----------|-----------|
| I think using Classroom leaderboards is a good idea   | 27.3      | 51.5     | 9.1       | 6.1      | 6.1       |
| I like learning with Classroom leaderboards   | 30.3      | 45.5     | 9.1       | 9.1      | 6.1       |
| I look forward to those aspects in my learning that require the use of Classroom leaderboards | 27.3      | 48.5     | 18.2      | 6.1      | 0.0       |
| I look forward to earning XP Points   | 36.4      | 33.3     | 21.2      | 6.1      | 3.0       |

Table 4 shows the results of the respondents' attitude towards the classroom leaderboards. 52% of the respondents think that classroom leaderboards are a good idea, 49% of the respondents look forward to learning that requires the use of classroom leaderboards and 46% of the respondents enjoy learning with the classroom leaderboards. The result also showed that 36% of the respondents look forward to earning XP points. Overall, the respondents' attitude towards classroom leaderboards is between agree and strongly agree.

Table 5. Results for student engagement

| <b>STUDENT ENGAGEMENT (SE)</b>   | <b>SA</b> | <b>A</b> | <b>UD</b> | <b>D</b> | <b>SD</b> |
|--|-----------|----------|-----------|----------|-----------|
| Classroom leaderboards encourage me in attending classes regularly                                 | 42.4      | 33.3     | 15.2      | 9.1      | 0.0       |
| Classroom leaderboards encourage me in listening carefully in class                                | 33.3      | 45.5     | 15.2      | 6.1      | 0.0       |
| Classroom leaderboards encourage me in making sure to study on regular basis                       | 33.3      | 42.4     | 15.2      | 9.1      | 0.0       |
| Classroom leaderboards contribute to me in having fun in the classroom                             | 48.5      | 42.4     | 3.0       | 6.1      | 0.0       |
| Classroom leaderboards contribute to me in learning new concepts                                   | 36.4      | 57.6     | 3.0       | 3.0      | 0.0       |
| Classroom leaderboards contribute to me in participating actively in classroom discussions         | 33.3      | 51.5     | 9.1       | 6.1      | 0.0       |
| Classroom leaderboards contribute to me in creating a healthy competition among my classmates      | 48.5      | 42.4     | 3.0       | 6.1      | 0.0       |
| Classroom leaderboards contribute to me in asking questions when I did not understand the lecturer | 42.4      | 33.3     | 21.2      | 3.0      | 0.0       |

Table 5 shows the result of students' engagement when using the classroom leaderboards. This shows that overall, the respondents agreed and that they felt engagement when using the classroom leaderboards in the classroom. 58% of the respondents agreed that the classroom leaderboards contribute to them learning new concepts. In addition, 49% of the respondents strongly agreed that the classroom leaderboards contributed to them having fun in the classrooms and created a healthy competition among their classmates. All in all, students participating in the survey reported a high agreement on engagement in relation to classroom activities in the gamified learning environment.

The results showed how gamifying a course using classroom leaderboard led to an increase in students' online engagement.

## 6. Discussion

Results of the study suggest that better student engagement is possible when a course is delivered through gamification. Students who took part in the classroom leaderboard view the experience positively. This is in agreement with what was mentioned by Deterding, Nicke, O'Hara and Dixon (2010) and Gamification (2010) where the intent of collecting points, badges and leaderboards is to encourage engagement and fun learning experience among students. Students feel motivated to participate and take charge of their learning when they are rewarded accordingly. In other words, when learning turns into a fun game, students feel more willing to compete with each other. This is in accordance with Ortiz-Rojas et al. (2019) and Garcia, Tor and Schiff (2013) where it is said that leaderboards provide the motivation for students to explore and engage in activities to emerge as the top competitor and subsequently allows them to feel accomplished. More significantly, when students immerse themselves willingly in the classroom leaderboard activity, this shows extrinsic and intrinsic motivation as put forward by Self-Determination Theory (SDT) (Ryan & Desi, 2000). Additionally, feedback received from the participants support the theory that gamification of the course fulfilled the elements of autonomy, competence, and relatedness.

## 7. Conclusion and recommendations

This study discovered that students benefited from using classroom leaderboards. This gamification method reveals that student engagement does not rely on expensive software and applications. The teacher/lecturer can instead simply turn an entire course into independent quests to seek information, complete tasks, and gain points which construe as fun and learning along the way. Findings of the study also support theories related to gamification and student engagement. It is therefore recommended that in any lessons or courses, elements of gamifications could be included to create better student engagement. In addition, course creators could study and identify aspects of the course that can be gamified and explicate these in their course documents. All in all, gamification is an effective method of promoting and enhancing student engagement and can be further explored to use in other areas beyond the classroom.

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