Students' Reactions to the Use of Leaderboards in an EFL Class: A Gamification-Related Pilot Study

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The purpose of this pilot study was to determine the range of answers required for multiple-choice questions for a future longitudinal study related to gamification in EFL. Gamification has been defined as "The use of game elements and game-design techniques in non-game contexts" (Werbach & Hunter, 2012, p. 26). This pilot study focused on the effects of leaderboard use in a gamified class, specifically, how students feel when they see their ranking on a leaderboard. Two activities that employ leaderboards were used in this study: English Central and extensive reading using MReader.

Each week, students were encouraged to do the two activities as much as possible for homework. In the following week, they would be shown their ranking on the class leaderboard which displayed how much they had done each activity successfully during the previous week. At the end of the semester, students were asked to complete a survey which asked them how they felt when they saw their ranking. Data were collected from two groups (n=42) of Japanese university students. Although students' responses varied, generally when students saw their ranking on the leaderboard they felt motivated for a variety of reasons to do more work.

INTRODUCTION AND AIM

The first phase of this pilot study will be conducted to collect data on the range of answers required for the multiple-choice questions for the surveys to be used in a future longitudinal study. This pilot study will also assess if the wording and order of questions is appropriate to collect the required data. This pilot study will focus on the relationship between leaderboards, performance, and emotions in a gamified classroom. Specifically, the way students feel when they see their ranking on a leaderboard in comparison to other students will be analysed. English Central and Extensive Reading (ER) using MReader will be used as they both provide leaderboards and both aim to improve the English ability of EFL students. This is a gamification-related study.

Gamification

Gamification has been defined by Werbach and Hunter (2012) as "The use of game elements and game-design techniques in non-game contexts" (p. 26). The 'game elements' are the pieces of the game. For example, in chess this could include the actual pieces, the board, and the rules. In an EFL classroom

they could be vocabulary quizzes, speed reading activities, and various other tasks. 'Game-design techniques' refer to the application of points, badges, leaderboards, and feedback to these elements. A non-game context is where these things will be applied to, in this case, an EFL class. Employing gamification can make learning and instruction more fun and engaging (Kankanhalli, Taher, Cavusoglu, & Kim, 2012; Kapp, 2012; Werbach & Hunter, 2012). Studies (Kapp, 2012) have shown that gamification is effective for changing behaviour and creating positive learning environments.

Gamification has been used as a motivating tool to make people adopt healthier lifestyles (Xu et al., 2012), be happier, be more sociable, solve world problems (McGonigal, 2011; Simões, Redondo, & Vilas, 2012), shop more often (Harwood, 2012), and to teach and learn various things (Werbach & Hunter, 2012). Gamification does not require digital technology; however, since being first mentioned in a blog post (Terrill, 2008), implementations of gamification have risen quickly due to new technologies being able to track and analyse data (Deterding, 2012). The Nike+ Running App in 2010 was one of the first and most famous examples of successful gamification implementation (Deterding, 2012). The Nike+ Running App motivated people to run more often by tracking, analysing, and comparing individuals' running data. Since then, businesses have been increasingly looking to gamification as a way to motivate and engage employees and customers (Werbach & Hunter, 2012) with the use of gamification expected to rise in the future (Codish & Ravid, 2014).

Sheldon (2011), in his seminal book *The Multiplayer Classroom*, claimed that all educational courses can be gamified. He included eight case studies that described and discussed how gamification was implemented in various classes from primary school to university. A review of the case studies show positive trends in relation to:

- points, badges, and leaderboards,
- allowing students to choose their own activities,
- collaboration and competition,
- higher levels of engagement which can lead to improved grades and class attendance.

Dynamics, mechanics, and components of gamification

Successful gamification of education is about matching the appropriate class content with the right game mechanics and game thinking (Kapp, 2012). However, there is debate in the field about how exactly gamification should be conceptualised (Kapp, 2015). Werbach and Hunter (2012) say that there are three major design elements to consider when gamifying an activity: dynamics, mechanics, and components (Werbach & Hunter, 2012). Werbach and Hunter describe dynamics, mechanics, and components as elements which should be conceptualised as a pyramid structure. Dynamics are at the highest level of the pyramid, mechanics are in the middle, and the components are the base of the pyramid. Components are the 'things' (e.g. tasks), mechanics are the specified interactions between the 'things' (e.g. the manner in which a task will be done),

and dynamics are the higher-level emergent interactions which are a result of the implementation of those components and mechanics. There can be some overlap in the three levels of abstraction.

Dynamics could include:

- Emotions: The emotional reactions a game can induce.
- Constraints: How the player responds to the rules and the meaningful choices they make.
- Narrative: The storyline of the game. Not always necessary for gamification.
- Progression: Player growth and development.
- Relationship: The social interactions.

Mechanics could include:

- Challenge: Tasks in the game that require effort to complete.
- Feedback: Information the player receives about their performance.
- Chance and randomness: A technique used to add excitement.
- Competition: Players competing with each other.
- Collaboration: Players working together to achieve a goal.
- Rewards: Can be intrinsic (motivation, inspiration, satisfaction) or extrinsic (badges, points, prizes).
- Win-state: When can a player win something? (Weekly? Monthly? End of course?) A game can have various win-states.

Components could include:

- Achievements: Defined objectives such as reading 10,000 words in a week.
- Avatars: A visual representation of the player.
- Badges: A visual representation of achievement.
- Content Unlocking: Players receive more content once specific goals have been completed.
- Leaderboards: A visual representation of players' rankings. Provides comparative feedback.
- Progress bars: A visual representation of a player's personal progress.
- Levels: A demarcation of player progress.
- Points: A numeric representation of game progression.
- Tasks / Quests / Activities: The things a player will do.
- Teams: Allow players to work together towards a common goal.

A dynamic cannot be guaranteed in a system; however, with the right blend of mechanics and components, the probability of achieving that dynamic increases (Werbach & Hunter, 2012). All three elements can have multiple connections to themselves and to the other elements. A teacher should only use the gamification elements which are suitable for their classroom.

Example 1: During a computer-based task (component-activity) a message (mechanic-feedback) pops up on the screen and says "Well done!" which may make the player feel proud (dynamic-emotion).

Example 2: Two students (component-teams) working together (mechanic-collaboration) on a task (component-task) perform better than another team (mechanic-competition). They receive a reward (mechanic-reward) which makes them feel proud (dynamic-emotion), builds their relationship (dynamic-relationship), and motivates them to continue studying (dynamic-progression).

Pilot Study's Gamification Description

This pilot study will focus on the relationship between the emotion-dynamic and the leaderboard-component. To evoke the emotion-dynamic, the mechanics of challenge, feedback, competition, rewards, and win-state will be used.

Dynamic: Emotions

Koster says, "A game is a system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback, that results in a quantifiable outcome often eliciting an emotional reaction" (as cited in Kapp, 2012, p. 7). This emotional reaction can lead to people improving the quality of their lives (McGonigal, 2011). Koster (2005) says that life is basically a game as we are all vying for some type of social status. In relation to social encounters, the emotions we feel in life can be the same as we feel when playing games. Some of these emotions according to Koster are:

- Schadenfreude: the gloating feeling you get when a rival fails.
- Fiero: the expression of triumph when you have achieved a significant task.
- Naches: the feeling you get when someone you mentor succeeds.
- Kvell: the emotion you feel when bragging about a mentee.

A major part of this pilot study is to find out what emotions are induced by the use of leaderboards in class.

Mechanics: Various

- Challenge: The students will do two activities: English Central and ER using MReader.
- Feedback: Detailed feedback is provided by the English Central and MReader websites. This pilot study will focus on the feedback provided by the leaderboards.
- Competition: The students will try to do the two activities more than other members of the class.
- Rewards: The students will receive the extrinsic reward of points. Whether the students receive intrinsic rewards or not will be determined during the data analysis of this study.
- Win-state: There are various degrees of win-state which are related to the leaderboards. Students receive a class grade in relation to their leaderboard ranking.

Component: Leaderboard

Leaderboards are comparative feedback which visually represent a player's ranking within a game (Codish & Ravid, 2014). Leaderboards are one of the most common components used in all types of games. Leaderboards can have a powerful effect on motivation. For example, if you can see how close you are to overtaking an opponent on the leaderboard, you may become very motivated to do the necessary activities in order to gain rank. However, if you are sitting low on the leaderboard you may feel disheartened and want to give up on the game (Werbach & Hunter, 2012). Philpott's (2013) research has shown that leaderboards in an EFL class in Japan can have a positive effect on student motivation and performance.

METHODOLOGY

Two groups of students (Group 1, n=17 <8 males, 9 females>, Group 2, n=25 <9 males, 16 females>) were asked to complete a survey at the end of a 12-week period of English classes. Both classes met three times a week for 90-minute classes. Students were asked to do the two assessed activities (English Central & ER using MReader) as much as possible for homework. Assessment would be based on how much they did each activity in comparison to the other students in their class. Students were told that each activity is worth 20% of their final grade for the semester. If at the end of semester they were at the top of the leaderboard, they could get the full 20%. If they were low on the leaderboard and had not done much work, their grade would be low. As a fail-safe, students were told that if their rankings were low, not because of lack of work, but because of high competition, they would receive a grade worthy of their effort. Students were shown the leaderboards once a week. A short period of time was allocated (about 3-5 minutes) for students to analyse and discuss the leaderboards with each other.

The surveys were administered using Google Forms. The surveys asked the students how they felt when they saw their ranking on the leaderboards. Open-ended questions were specifically used in order to get unrestricted answers. Students were told that they could answer in English or Japanese. By analysing the qualitative data received from the open-ended questions, the most common type of answers will be categorised and then used as set multiple choice options in larger quantitative studies. The data will be coded, tabulated, and then analysed.

After collecting data from Group 1, it seemed apparent that due to rudimentary survey design it would be difficult to link students' rankings to their emotions about the activity. As it was expected that people in the top 33% of the leaderboard would write different answers than people in the bottom 33%, the survey was remade in a way that would group rankings with the answers of the open-ended questions. This change made data analysis in Google Forms easier, however as Group 1 did not do the survey again and some of the

questions slightly changed after the redesign, the results below have not been amalgamated.

Survey Questions

      1:      Are you male or female: male   female

      2:      Extensive Reading is enjoyable

              strongly disagree   disagree   so-so   agree   strongly agree

      3:      Generally, where is your MReader ranking?

              bottom 33%   middle 33%   top 33%

      4:      How do you feel when you see your MReader ranking?

              _____

      5:      English Central is enjoyable

              strongly disagree   disagree   so-so   agree   strongly agree

      6:      Generally, where is your English Central ranking?

              bottom 33%   middle 33%   top 33%

      7:      How do you feel when you see your English Central ranking?

              _____

RESULTS

Group 1's responses to the MReader leaderboards:

1:      male = 8 (47%), female = 9 (53%)

2:      ER is enjoyable (1 = strongly disagree, 5 = strongly agree).
Average = 3.82

3:      Generally where is your MReader ranking?
          Bottom 33% = 5(29%)   middle 33% = 9(53%)   top 33% = 3(18%)

Group 2's responses to the MReader leaderboards:

1:      male = 9 (36%), female = 16 (64%)

2a: Male: Where is your MReader ranking?
          Bottom 33% = 3(12%)   middle 33% = 4(16%)   top 33% = 2(8%)

2b: Female: Where is your MReader ranking?
          Bottom 33% = 4(16%)   middle 33% = 6(24%)   top 33% = 6(24%)

4:      How do you feel when you see your MReader ranking?

Refer to TABLE 1 for tabulated responses.

TABLE 1
How do you feel when you see your MReader ranking?

Group 1	x	Group 2	x
Must read more books	6	**Bottom 33%**	
Motivated	3	Should read more	5
Enjoy reading books	3	Deeply ashamed	1
Must read books with more words	2	Should do more, but don't	1
Happy	2	**Middle 33%**	
So-so	2	Should read more	6
Regret	2	Motivated to get better rank x 2	2
Sad	1	Should do more, but don't	1
Disappointed	1	**Top 33%**	
Embarrassed	1	Motivated by rank	3
		Satisfied	2
		Must do more	2
		Want to read faster	2
		Nothing	1

Group 1's responses to English Central's leaderboards:
5: English Central is enjoyable (1 = strongly disagree, 5 = strongly agree). Average = 4.29
6: Generally, where is your English Central Ranking?
Bottom 33% = 8(47%)   middle 33% = 5(29%)   top 33% = 4(24%)
Group 2's responses to English Central's leaderboards:
6: What is your English Central ranking?
Bottom 33% = 11(44%) middle 33% = 8(32%)   top 33% = 6(24%)
7: How do you feel when you see your English Central ranking?
Refers to TABLE 2 for tabulated responses.

TABLE 2
How do you feel when you see your English Central ranking?

Group 1	x	Group 2	x
Must do more	5	**Bottom 33%**	
Motivated by competition	3	Must study harder	6
Sad	2	Motivated by competition	1
Motivated by enjoyment	2	Feel a gap between top and bottom	1
Want to do more	2	Deeply ashamed	1
Fun but not enough time	1	Should do more, but don't	1
Proud	1	**Middle 33%**	
Sad but want to do more	1	Must do more	6
Will do more	1	Should watch more	2
		Top 33%	
		Satisfied	2
		Glad	1
		Have to use it more	1
		Nothing	1
		Will continue	1
		Should speak more	1

The tabulated data above for TABLE 1 and TABLE 2 show the frequency of coded comments related to the leaderboards. The results show the difference in data collation between Group 1 and Group 2 due to a change in survey design after data was collected from Group 1. Some of the students' spelling and grammar mistakes were corrected during the coding stage. Whilst correcting these minor mistakes, special attention was given to make sure the meaning of the students' answers were not altered. Complete student answers can be found in APPENDIX A and APPENDIX B.

DISCUSSION

Data collected from the surveys shows some interesting trends. The most common comments being that when students see the leaderboards they feel they should do more. This was most prevalent in the students situated in the bottom 33% and middle 33% sections of the leaderboards. Some students clearly articulated why they should do more; however, some did not. Based on the data collected, the general response of 'must/have to do more' and 'motivated to do more' could be subdivided as this:

- Must/have to do more to gain rank on leaderboard.
- Must/have to do more to gain social status in class.
- Must/have to do more to improve grade.
- Must/have to do more to avoid embarrassment.
- Motivated to do more to improve English ability.
- Want to do more because the activity is enjoyable.

The above comments could be considered positive reactions to seeing their leaderboard rankings. Other answers students gave included these:

- Proud
- Satisfied
- Happy / glad
- So-so / don't care / nothing
- Regret
- Sad
- Disappointed
- Embarrassed
- Ashamed

How do these emotions affect future performance? Do the students who answered that they 'must do more to gain rank' actually go on to do more? Do the students who feel regret go on to perform better in order to avoid the negative feeling? Will the students who feel satisfaction continue to do enough work to keep their ranking? This pilot study leads into a longitudinal study that will measure the actual effect the use of leaderboards have over an extended period of time.

Compared to Group 1, the design of Group 2's survey was more suitable for data analysis. The importance of linking the students' perceived ranking to their feelings is clearly visible when looking at Table 1 and Table 2. The data for Group 2 is easier to analyse. Other small design issues that need consideration are:

- For Group 2, the question about how much they enjoy English Central was forgotten.
- The wording for the questions in relation to ranking is different; for Group 1, the word 'generally' and 'where' was used in the sentence; for Group 2, the word 'generally' was not included and 'what' was used instead of 'where'.
- The English Central ranking for Group 2 did not distinguish between male and female. This will need to be fixed in order to make data analysis easier for the future study in relation to gender.

The students were asked to select where their ranking was on the leaderboards. This was a rough estimate made by the students. Data collected from this study shows that this process needs to be more precise. For example, Group 1 in relation to their MReader ranking, only 18% said they were in the top 33% of the class. This issue will be dealt with in the future study.

Based on the data collected and analysed in this pilot study, the future questionnaire could look like this:

1. Are you male or female?   male   female

2. Where is your (MReader/English Central) ranking?
a. bottom 33%   b. middle 33%   c. top 33%

3. Where is your (MReader/English Central) ranking compared to the last survey?
a. got better   b. stayed the same   c. got worse

4. How do you feel when you see your leaderboard ranking now? Select all that apply.

☐ Must do more to gain rank on leaderboard.
☐ Must do more to gain social status in class.
☐ Must do more to avoid embarrassment.
☐ Must to do more to improve grade.
☐ Want to do more because I enjoy the activity.
☐ Motivated to do more to improve ability.
☐ Think I should do more but can't
☐ Proud
☐ Excited
☐ Envious

☐ Satisfied
☐ Happy / glad
☐ So-so / don't care / nothing
☐ Unsatisfied
☐ Regret

☐ Sad
☐ Disappointed
☐ Embarrassed / ashamed
☐ Demotivated
☐ *Other* _____

CONCLUSIONS

The open-ended questions used in this pilot study gave some insight into how students feel when they see their ranking on a leaderboard. Sometimes the students did not answer the questions in the intended way. Therefore, using multiple-choice questions in a longitudinal study will ensure that students answer in the intended manner. The qualitative data analysis provides a tested range of responses to multiple choice questions for the follow-up qualitative study. For the longitudinal study, all questions and answers will be translated into Japanese to make sure students completely understand the survey. Survey design was also an important issue raised in this pilot study. Surveys should be designed in way that makes data analysis easier for the researcher.

In a meta-analysis of empirical studies related to gamification, Hamari, Koivisto, and Sarsa (2014), stated that gamification has been shown to have a positive effect; however, the effects were dependent on the context and the users. Therefore, before applying gamification, teachers should think about how it

could work alongside their current teaching methodology. Gamification should not be thought about as a stand-alone entity. A course should not be built around gamification, but rather any gamification should be built around a course. Teachers should only apply the gamification elements which are suitable for their students.

As gamification is a relatively new concept, most of the discussion about its effectiveness is based on anecdotal evidence with perceptions ranging from negative (Meredith, 2011) to positive (Nielsen, 2012). This has led to many academics calling for empirical studies to prove how effective it is, learn about the interdependent effects of the game mechanics, and foster theory development (Hamari et al., 2014; Kapp, Blair, & Mesch, 2014; Thiebes, Lins, & Basten, 2011). Kapp (2015) in his reflection about gamification in 2014 said that researchers need to analyse the independent variables of gamification to identify the elements that encourage learning. This pilot study was carried out to identify the emotions induced by the use of leaderboards for class activities. The effects of these emotions on learner motivation and achievement will be discussed in a follow-up study.

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APPENDIX A: MReader Comments

Group 1: MReader comments

- *I enjoy reading English books, so I feel reading English books is pleasure rather than study. The   difference between people who are top and people who are bottom is too big.*
- *I read two books every week, but I must read books with more words. However, I can't read long story in a day, so I can't remember the whole story.*
- *I'm little happy because I place in Top 33%. But I haven't read more than 50000words yet, so I'll do my best.*
- *I'm in top 33% in terms of total words but I haven't read many books and I should read more often.*
- *I feel that it wasn't enough the number of books I read. I try to read more books!!*
- *So sad and I think I should do more.*
- *I feel so-so but I'm happy because I have never failed an MReader quiz.*
- *When I see my ranking I think that I have to read more books. It is a very motivating for me.*
- *I lost my student card and couldn't borrow books for some time... I'm embarrassed, so I think I have to read more books.*
- *I wanna read books, but I don't have enough time to read, so in the winter vacation, I want to read those.*
- *I don't feel about the ranking especially. Certainly, it is good and necessary to read a lot of English sentences, but I couldn't enjoy this type of education. I'd like to do with more pleasure.*
- *I read Romeo and Juliet, very long story, but this book doesn't include MReader. Anyway, I must read more.*
- *I regret these results. But I don't have much time. I will do my best from now on.*
- *I have to read more book and answer the quiz*
- *It makes me happy. I almost enjoy all stories of extensive reading books. But sometimes reading book is pain in the neck. When I feel so, to see the ranking motivates me!*
- *I feel regrettable and I think I have to read books more. I must try to make enough time to read books and answer the question.*
- *I must read more books which have a lot of words, and I try to pass all books I read.*

Group 2: MReader comments

MReader bottom 33%

- *I feel that I should read more books.*
- *I have to make more effort.*
- *I should read more books.*
- *I think I must read more books.*
- *I need to read more and more books.*
- *Deeply ashamed.*
- *I think I should do more, but I never start, just think it*

MReader middle 33%

- *I need to read more.*
- *I should read more books.*
- *I must study more.*
- *I want to be in top 33%. I will try to be in top!*
- *I think I should read more books. But I don't translate into action.*
- *I feel that I must do it harder. I don't like middle rank. I like top!*
- *I must read more books...*
- *I must read more books and answer questions better.*
- *I'll have to read more books.*

MReader top 33%

- *Want to read faster than now.*
- *I'm satisfied with my ranking because I'm top. But I don't really much care about my ranking because I just want to improve my English so that's why I'm reading books. But I am also a competitor so I think I need someone who can beat my record.*
- *I am satisfied with my ranking.*
- *I must do more.*
- *Nothing.*
- *I think it is good to see my ranking. This ranking motivates me to read, or use English Central, which makes my English level higher.*
- *I think I should read more books.*
- *When I see the rank of MReader, I think I should read more books. I want to be able to read more difficult books.*

APPENDIX B: English Central Comments

Group 1: English Central Comments

- *I must do English Central more and try to speak English more frequently. I should try to find time to do it.*
- *I thought I studied hard in English Central, but many people have studied harder. I have to do my best.*
- *I have to watch more. I can't use English Central on my computer. I want to watch with my iPhone.*
- *English Central is a lot of fun. However some videos are a little difficult for me. I must see more.*
- *I think English Central is so good for me because we can learn many things. If I have a time, I'll do English Central more.*
- *I'm sad because I have low score in speaking section compared with other sections.*
- *English Central is very useful for us. I think everybody in this class should study by using English Central.*
- *I want to be Top. lol*
- *I'm sad. I also feel I must try to make the time. I enjoy English Central but it is time consuming.*
- *It is very fun. But I don't have enough time to use English Central.*
- *When I see my ranking, I feel that I worked very hard and I could do it! And I can see other classmate's score I feel "I worked more".*
- *It motivates me. When my ranking is lower than last week, I decide to do English Central more!!*
- *These days, I was too busy to do English Central, so I'll start again more hard. I like English Central. Thanks to it, My English has improved.*
- *I cannot do it at my home. But I will do my best in the PC room of the University.*
- *I like to use English Central, but I had no time to use it. I want to improve my English speaking ability more.*
- *I feel I have to watch more videos.*
- *So sad. but now I read a lot of books so I don't care so much.*

Group 2: English Central Comments

Bottom 33%

- *I want to be top 33% so I need to study harder.*
- *I will use English Central little by little.*
- *I must study harder.*
- *I feel a gap between the people who uses frequently.*
- *I must do it...*
- *I feel that I should do it harder.*
- *I need to try English Central more.*
- *Should do it more.*
- *I have to do this.*
- *Deeply ashamed.*
- *Like MReader, I think I should do it more. but I can't translate into action.*

Middle 33%

- *I should watch videos more. In English Central, there are a lot of interesting videos so I keep going.*
- *I think keep on doing English Central every day is so important.*
- *I must do more.*
- *I must use English Central more...*
- *I have to do it more.*
- *I think I must do it harder.*
- *Have to watch more videos.*
- *I think I must use English central.*

Top 33%

- *I am satisfied with my ranking. I will try to continue my work.*
- *I'm satisfied with my ranking but I think not so many people in my class use English Central so that's one of the reason I'm on the top.*
- *I was glad.*
- *When I see the rank of English Central, I think I have to use it more.*
- *My opinion for ranking is as the same as MReader. English Central is good, but I often feel that most of the videos are not interesting. I usually use YouTube for listening English, so I felt like videos I saw on YouTube can be counted. (I know it is depends on what kind of video I saw on the YouTube)*
- *I should speak English more. I want to improve my pronunciation of English.*