

# **Gamification for Enhancing Student Motivation: Research Reflections**

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## **Abstract**

Gamification is the application of game elements (such as rewards, rapid feedback cycles, and competition elements) to a non-game context in order to motivate users and engage them in activities that they would otherwise find boring. It is exactly this aspect of gamification that has attracted the attention of educators seeking to design learning experiences that can engage learners and increase their motivation on a cognitive, emotional and social level. My research project aims to evaluate the effectiveness of gamification on higher education students' engagement, motivation and academic attainment. This is a research project in progress, so in this paper I will describe the rationale for the study, the theoretical framework, the methodology, and the expected outcomes.

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## **Rationale**

In recent years applications of gamification have appeared in a variety of sectors including business, health, sustainability, task management, crowd-sourced science, and user generated content for programmers to name a few (see Deterding, 2012). Gaming elements such as rewards (for example points, tokens, badges, trophies, prizes, level-ups, etc.), rapid feedback cycles, and competition elements (such as leaderboards) are used to motivate users and engage them in activities that they would otherwise find boring. It is exactly this aspect of gamification that has attracted the attention of educators seeking to design learning experiences that can engage learners and increase their motivation on a cognitive, emotional and social level. In short, gamification in education is “a tool to increase student motivation and engagement” (Dominguez, Saenz-de-Navarrete, de-Marcos, Fernandez-Sanz, Pages, & Martinez-Herraiz, 2013, p.380) and it is of great relevance to my particular teaching context.

## **Teaching English as a Second Language in the UAE**

In my teaching context in the United Arab Emirates, student motivation and engagement is considered a major obstacle towards academic success, with teachers often reporting that Emirati students are uninterested and lack motivation for learning (Aubrey & Coombe 2011). Emirati students are taught Arabic at school and once they graduate they can attend one of three government-funded higher

education institutions where undergraduate and post-graduate courses are delivered through the medium of English.

Only about a fifth of high school graduates manage to enter directly into the undergraduate programs (see Gjovig & Lange, 2013). The rest have to attend an intensive preparatory English course in order to raise their level of academic English proficiency. Entry to the English preparatory course is determined by the students' score on the Common Educational Proficiency Assessment (CEPA), an exam prepared and administrated by the Ministry of Higher Education and Scientific Research (MoHESR). The CEPA comprises two sections: a section on vocabulary, grammar, and reading (VGR) and a section on writing. Based on their VGR score, students can enter one of four course levels (1-4) in the preparatory course with each level aligned to the Common European Framework of Reference (CEFR) (e.g., Level 1 is CEFR A2, Level 2 is CEFR A2+, Level 3 is CEFR B1, Level 4 is CEFR Level B2-).

I teach male Emirati students in Level 3, which is at a B1 level on the CEFR. All students have access to iPads and all course materials are delivered through the iPads. My students are typical Emirati students who lack motivation and they do not engage with English practice activities outside of the classroom. Given the specific context, I would like to try to apply gamification mechanics and dynamics to my course in an effort to increase my students' motivation and engagement with the course materials in and out of class and ultimately increase their academic achievement.

## **Effects of Gamification**

While gamification in education is seen as “a serious approach to accelerating the experience curve of learning, teaching complex subjects, and systems thinking” (Kapp, 2012, p. 13), the study of the impact of gamification in educational settings has been rather limited, empirical evidence is sparse, and results so far have been mixed (see Attali & Arieli-Attali, 2015; de-Marcos, Dominguez, Saenz-de-Navarrete, & Pages, 2014). Cruz and Penley (2014) used gamification to engage university students in a review activity called *The Capitalism Quest for Knowledge* over the course of two weeks. The study found that the level of student participation increased considerably when compared to the traditional in-class review activity. Students also reported that the competitive nature of the exercise was a strong motivator and that the activity positively affected their learning (Cruz & Penley 2014). Positive results were also reported by Buckley and Doyle (2014), who investigated the impact of gamification on student motivation using an online learning intervention over a three-week period to teach undergraduate students knowledge about the national taxation system. While there was no control group, researchers found that students’ knowledge increased and intrinsic motivation was positively correlated with participation.

ICT was the subject used for gamification in the study by Ibanez, Di-Serio, and Delgado-Kloos (2014). The week-long study with university students showed positive effects on the engagement of students with the gamified learning activities and a moderate improvement in terms of learning outcomes. The study results show that an increase in student engagement does not necessarily mean an increase in

student learning. For example, Attali and Arieli-Attali (2015) found that while younger learners performed better in a gamified math test than adults, gamification had no effect on participants' response accuracy. The researchers suggested that the positive effects of gamification on student motivation and attainment may be able to manifest over longer periods of time. In another study on the gamification of a 16-week course on calculus, Goehle (2013) found that while the gamification mechanics seemed to improve student engagement, there was little evidence with regard to their impact on student academic performance.

Dominguez et al. (2013) applied gamification in an e-learning IT course for undergraduate students. They found that while students' attitudes were positive, the gamified activities were useful in helping students develop practical competences, but they hindered students' "understanding of underlying theoretical concepts" (Dominguez et al., 2013, p.386). Similarly, de-Marcos, Dominguez, Saenz-de-Navarrete, & Pages (2014) used gamification in a 15-week blended learning course on ICT with undergraduate students and found that while the students in the experimental group performed better in practical assignments, students in the traditional course performed better in the final written exam. This result indicates that gamification activities focused on skills acquisition and neglected knowledge acquisition. It was also found that gamification overemphasized competition significantly decreasing student participation in the activities. Hanus and Fox (2015) applied gamification in two communications courses with university students. They found that students in the gamified course showed less motivation, satisfaction, and empowerment over time than students in the traditional course. Students in the

gamified course also scored less in the final exam. Hanus and Fox (2015) concluded that the use of competition game mechanics such as leaderboards and badges did not improve students' learning outcomes and even harmed students' intrinsic motivation. Similarly, Koivisto and Hamari (2014) found that the perceived enjoyment and usefulness of gamification decline with use as the novelty effects decrease over time.

The studies reviewed above were conducted primarily with university students. However, their methodologies and designs varied significantly. The timeframe of the interventions ranged from a one-off test to a 16-week semester long course. Only some of the studies included a control group. The measurements of student motivation, engagement and academic attainment varied significantly from study to study. Finally, the different gamification frameworks applied to the traditional courses makes results difficult to compare and generalise. The only viable conclusion so far is that the effects of gamification are dependent on the particular educational context in which it is implemented and on the users involved (Hamari, Koivisto, & Sarsa, 2014). Furthermore, researchers caution that the inappropriate application of game mechanics can lead to a loss of motivation, interest and engagement and consequently decrease in student learning (Kalinaukas, 2014; Deterding, 2012).

### **Proposed Study Design**

Given the inconclusive results of gamification projects, the lack of research on the application of gamification in the development of second language learning skills,

and the urgent need to address student motivational issues in the context of ESL in the UAE, the present study aims to contribute to the literature by investigating gamification design, application and impact in second language learning through the lenses of self-determination theory (Deci & Ryan, 2000) and flow theory (Csikszentmihalyi, 2008). Self-determination theory will help examine the basis for student engagement in gamified activities and flow theory will help examine the state of student satisfaction and enjoyment of the gamified environment.

The proposed study will comprise two distinct phases. In Phase 1, a gamification framework will be designed based on gaming mechanics and dynamics and best practices in gaming design (see Raymer, 2011). The gamification framework will be applied in a typical ESL course. Given the particular weakness of Emirati students with grammar, vocabulary and reading, these language skills will be targeted for gamification. The course will include in class and out of class gamified activities. The framework will be piloted over one semester with a group of students. Based on the results of the pilot, the framework will be adjusted and prepared for application in Phase 2.

Phase 2 of the project will perform a quasi-experimental applied research study. It will use randomized experimental and control groups and a pre/post design to isolate the effects of the gamification course as the experimental stimulus or treatment. The study will include use of multiple measures (quantitative and qualitative) and mixed methods involving descriptive and inferential statistics (chi-square, t-tests, correlations, GLM-ANCOVA, and linear Regression analysis) to determine impact of the gamification course (Isaac & Michael, 1997; Fitzpatrick,

Sanders, & Worthen, 2003). Quasi-experimental studies that use scientific procedures, partial controls, and both qualitative and quantitative data can be rigorous and appropriate to answer descriptive, normative, and causal questions based on practical circumstances in educational settings and institutions (Chatterji, 2007; Schwandt, 2007).

Two groups of level 3 students in the Foundations Program (a control group and a treatment/experimental group) will be involved. Both the experimental and control groups will be randomly selected and assigned to either two gamification courses or two traditional courses in the Foundations Program. Specifically, there will be a total of about 50 students in the experimental group and an equal number in the control group. Students will enjoy a similar level of baseline proficiency as measured on the CEFR scale upon entry to the course using their CEPA score (Vocabulary, Grammar, Reading – VGR). Each group will study for 16 weeks. Both groups will take the same initial and follow-up assessments (in the experimental group the assessments will be part of the reward system). Both experimental and control group courses will be delivered via the iPads. In addition to the course materials and the gamified activities, I will also create an Edmodo site for the experimental group so students can showcase their rewards, interact with their classmates, and provide feedback about the course.

### **Data Collection and Analysis**

Qualitative and quantitative data will be collected using a range of formal and informal instruments. To assess the impact of gamification on students' academic

performance, there will be a pre- and post-VGR test administered to both the experimental and control groups. The pre-treatment VGR score will be the students' entry VGR score to their course. The post-treatment VGR score will be the students' performance on the VGR portion of the final exam.

While baseline VGR test results should be similar for all students going into level 3 in the program, there is still a small range of scores that can produce significant baseline differences. Therefore, to enhance the precision and accuracy of statistical analysis of results, the General Linear Model (GLM) Analysis of Covariance (ANCOVA) procedure in the SPSS software (Darren & Mallery, 2003; Norusis, 2006) will be used to determine if there are any statistically significant mean estimated VGR post-test differences between the experimental and control group, while controlling for any pre-test differences between the groups. ANCOVA is a well-established procedure used in quasi-experimental designs, as described by Voelkle and Ackerman (2007). As reported by Isaac and Michael (1997) and Oaks (2001), ANCOVA is used as part of a noise reduction procedure and can control for confounding variables that can limit ability to isolate the potential impact from the intervention. Based on a quasi-experimental design, planned use of random sampling, and pre/post VGR assessments, ANCOVA will likely provide a more accurate adjusted posttest estimates for statistical comparison (Maxwell & Howard, 1981; Frigon & Laurencelle, 1993; Isaac & Michael, 1997; Keselman et al., 1998, and Oaks, 2001).

Based on the works by Hedges (1981), Rosenthal (1994), Lipsey and Wilson (2001), and Voelkle and Ackerman (2007), the analysis will also use Hedges's G

Effect Sizes (ES) to interpret the practical significance of any ANCOVA findings or the magnitude of effects of gamification placed in standard deviation units. Specifically, any covariate (baseline VGR) adjusted mean (posttest VGR) differences will be divided by the unadjusted pooled within-group standard deviation. Based on review of guidelines by Rosnow and Rosenthal (1996), the following scale will be used to interpret Hedges's G effect sizes: (a) "negligible effect" is less than .24; (b) "slight effect" is from .25 to .39; (c) "slight to moderate" effect is from .40 to .59; (d) "moderate effect" is from .60 to .79; and (e) "strong effect" is .80 and above.

To examine the impact of gamification on students' motivation, the Academic Motivation Scale (AMS) will be administered to experimental and control group students at the start and at the end of both 16 week courses. Questionnaire results will be coded and formatted into both ordinal and interval level measures to facilitate comparison as follows: (a) pre/post change in proportions will be examined between experimental and control groups using cross-tabulation tables and chi-square and phi statistics (Walker, 1999); (b) mean change scores will be examined within and between the experimental group and the control group using independent sampled t-tests (Box, Hunter, & Hunter, 2005).

To examine the effects of gamification on student participation and engagement, the following measures will be applied: each student will be assigned a composite score based their attendance (students will be grouped based on 0-5% absence, 6-10% absence, 11-15% absence, 16-20% absence, and 20+% absence); the total number of out of class activities completed by each student; and for the

experimental group, the level of rewards achieved during the course. Independent sample t-tests will examine mean differences for attendance and out of class activities between the experimental and control groups. Pearson's R will be traditionally used (Box, Hunter, & Hunter, 2005) to determine if there is a correlation for the experimental group between the number and level of awards achieved and pre/post changes and outcomes on the VGR Test.

To examine students' satisfaction and enjoyment of the gamified activities, an attitudinal survey will be administered to the experimental group at the end of the course. Results will be analysed using descriptive statistics.

Finally, qualitative data will be collected through student interviews and their posts on the Edmodo site. A sample of 6-8 students (low, middle, and high achievers) will be interviewed at the end of the gamified course. Data will be thematically coded and analysed. The student postings on the Edmodo site will be used to draw conclusions about the effects of gamification on social comparison.

Items and scales for student motivation and engagement and process measures for attendance and out of class activities, as well as whether students received the gamification course or the traditional course, will be evaluated using step-wise linear regression analysis to determine the best predictors for improving vocabulary, grammar, and reading scores.

## Conclusion

The integration of gaming principles in second/foreign language acquisition is a new and fairly unexplored area. The proposed research study will apply a systematic pedagogical framework that will not only outline how gamification can be applied in a language education course but also investigate its impact on student engagement, motivation and learning.

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