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Can gamification improve student engagement and learning? A proposed quasi-experiment

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Management education has traditionally been delivered in tedious and disengaging manner. Students manifest their disengagement in five dimensions - values, motivation, behavioural, interactional and competing involvements. This research targets motivation, behavioural and interactional disengagement using gamification. This project aims to investigate the impact of implementing gamification elements in an undergraduate managerial communication course on the students' engagement and academic performance. Grounded in Self-Determination Theory, this project develops an online and in-class gamified learning intervention by aligning game attributes to desired behaviours and learning outcomes. Using a pre- and post-test survey, the researchers will examine student perceptions of the gamification intervention. Students' written reflections on their gamification experience will also be subject to a thematic analysis. The researchers anticipate an improvement in student engagement and learning outcomes. Based on the findings, a set of design principles to guide future gamification interventions will be developed.

Keywords: gamification, student engagement, academic performance, learning design

Introduction

Management education is seen as a preparation for managing, and often the efforts to teach management are disassociated from context and experience (Gosling & Mintzberg, 2006). Students find that the content delivered via traditional lecture and tutorial formats is often tedious and disengaging - negatively impacting on academic performance. Brint and Cantwell (2014) proposed that student disengagement can manifest in five distinct dimensions: (1) values disengagement - pertains to students who do not hold education in high regard, consider it a low priority, or view studying solely as a means to obtain a qualification; (2) motivation disengagement - when students lack the motivation for educational objectives or goals; (3) behavioural disengagement - when students allocate limited time to their studies, frequently skip classes, or fail to complete assignments; (4) interactional disengagement - when students do not engage with their teachers or peers, resulting in a lack of academic interactions; and (5) competing involvements - included non-academic pursuits, ranging from entertainment and social activities to paid employment. In this research, gamification will only target students who are motivationally, behaviourally and interactionally disengaged as it will not work with students who are disengaged because of their values or competing involvements.

Gamification

Gamification uses "game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p.10). It is the "use of game design elements in non-game contexts" (Dicheva et al., 2015, p.75). It involves the purposeful integration of game-like elements such as points, badges and leaderboards into educational activities or materials to increase student engagement. Gamification is an emerging instructional approach (Rivera et al., 2021, Bai et al., 2020). Dicheva et al. (2015) conducted a meta-analysis of 24 quantitative studies on the effectiveness of gamification in education and suggest that gamification can be a useful tool for increasing student engagement and motivation. Potentially, the use of gamification can bring about positive impacts on students who are otherwise demotivated and disengaged (Silva et al., 2019). Gamification can make users behave in a desirable manner and has been increasingly used in business, marketing, wellness and ecology initiatives (Dicheva et al., 2015). However, there is a scarcity of scientific studies on the application of gamification in management education, and that the studies that exist are lacking in both robust conclusions and scope (Silva et al., 2020).

Gamification and student engagement in higher education

The topic of gamification and student engagement in higher education has gathered significant attention in recent decades. The literature suggests that gamification can create a more enjoyable and engaging learning

environment, leading to increased retention of knowledge and improved learning outcomes (Sailer et al., 2017). By transforming traditional educational approaches into more interactive and immersive experiences, gamification has the potential to revolutionise higher education and contribute to the development of a highly engaged and motivated student population. One area of research that emerges from the literature is the significant relationship between gamification and student motivation. Various studies have reported a positive correlation between the use of gamified elements, such as leaderboards, badges, and points, and increased motivation levels in students (Dicheva et al., 2015; Hamari et al., 2014). Gamification taps into intrinsic motivating factors, such as autonomy, competence, and relatedness by providing students with meaningful challenges, instant feedback, and a sense of accomplishment. By further exploring the mechanisms through which gamification enhances student motivation, researchers can develop more effective gamified interventions and tailor them to individual student needs, ultimately leading to improved learning outcomes (Landers, Bauer, Callan, & Armstrong, 2017). Furthermore, gamification has been found to promote active participation, critical thinking, problem-solving skills, foster peer interaction, teamwork, and knowledge sharing (Landers & Callan, 2014).

Gamification and academic performance in higher education

There is evidence that shows that gamification positively impacts academic performance in higher education. Silva et al. (2020) conducted a literature mapping of gamification in management education and found that the majority of articles that applied gaming as a methodology for teaching management reported that their student participants felt that their learning improved with consequences for their final level performance. Similarly, a meta-analysis of 30 independent interventions drawn from 24 quantitative studies found moderate effect size for gamification on student learning outcomes (Bai et al., 2020). However, there are some studies that found no significant difference in academic performance who access supplemental material through gamification and those who do not (Buhagiar & Leo, 2018). Frost et al. (2015) also found that the gamification of the learning management system (LMS) did not result in significant improvements in learning outcomes although they found significant impact on relatedness and student interest.

Self-determination theory

One of the theories most used to explain how gamification can foster engagement in education (Silva et al., 2020) is Self-Determination Theory (SDT) which posits that there are three basic psychological needs that must be satisfied for an individual to be motivated and engaged: autonomy, competence, and relatedness (Ryan & Deci, 2002). Autonomy refers to the need to feel in control of one's own behaviour and choices. Competence refers to the need to feel capable and effective in one's actions. Relatedness refers to the need to feel connected to others and feel a sense of belonging. Gamification can be used to satisfy these three basic needs - using badges and points to give students a sense of autonomy over their own learning, using leaderboards to give students a sense of competence by allowing them to see how they are doing compared to their peers, and the use of a hero's adventure storyline to give students a sense of relatedness by creating a shared experience that they can all participate in (Frost et al., 2015). Research has found strong evidence that SDT exhibits widespread applicability across different cultures-and the fulfilment of the three psychological needs correlated positively with achievement (Nalipay et al., 2020).

A framework for student engagement

This study will adapt Rivera and Garden's (2021) gamification for student engagement framework. The framework intends to fill the gap between practice and theory, enables the systematic design of gamified learning experiences, and can be used to gather much-needed empirical evidence about the effectiveness of gamification on desired outcomes (Landers, 2014). The framework includes three main components:

1. **Game attributes:** This includes nine categories of game attributes that can be used to design gamified learning experiences - narrative, characters, challenge, feedback, rewards, user interface, mechanics, social interaction, and assessment. The game attributes must align with the desired student experience and learning outcomes.
2. **Student experience:** This involves the selection of the desired student experience, which can be based on the learning objectives, the target audience, and the context of the learning experience. When selecting the desired student experience, the designer of the learning experience needs to consider the cognitive, affective, and behavioural aspects of student engagement.

3. Learning outcomes: This involves the selection of the desired learning outcomes, which can be based on the learning experience. When deciding on the learning outcomes, the designer of the learning experience needs to consider the cognitive, affective, and behavioural aspects of learning outcomes.

While research findings indicate that tangible rewards (such as prizes) can undermine intrinsic motivation (Deci, et al., 1999), gamification can be designed to enhance user autonomy by enabling them to set their own goals and make choices within educational contexts. This approach helps students see the relevance of gamification to their learning goals and the connection between learning outcomes and game elements (Dahlstrom, 2012).

Research aim

This project aims to investigate the impact of implementing gamification elements in an undergraduate managerial communication course on the students' engagement and academic performance. In line with this aim, we address two research questions:

1. How does gamification impact on student engagement as measured by the Higher Education Student Engagement Scale (HESES) and the Gameful Experience Questionnaire ?
2. How does gamification impact on academic performance?

Methodology

Context and participant recruitment

This project is a pilot study that will be implemented in the first year Managerial Communication unit (MGF1100) at a large university in semester 2, 2023. Ethics approval was obtained from the University Human Research Ethics Committee (Project ID: 39370). The project team will gamify the online content and classroom activities in weeks 5-8. The current content in Moodle will be used. Gamification elements (such as conditional activities, progress bar, leaderboards) will be integrated in the unit's Moodle site in weeks 5-8. During the gamified weeks, the completion of Moodle online activities will earn students points which they accumulate for their team. In the classroom, an overarching storyline running through the gamified weeks will integrate a series of challenges for student teams to complete each week. These challenges will include tasks that apply the specific knowledge and skills in managerial communication that the students learn for that week. Completing the challenges earns the team points which are reflected in the leaderboard. Top teams each week will receive prizes and get their photo taken and displayed in Moodle. Prizes will be awarded to top teams at the end of the gamified period. There are 286 students enrolled in the Managerial Communication unit in semester 2 2023. Most of them are enrolled in the Bachelor of Business course although there are a few arts and education students who choose this unit as an elective. All enrolled students will be invited to participate to complete the pre-test questionnaire via email before the gamification starts (week 4). At the end of week 8, students will be invited to complete the post-test questionnaire via email.

Research design

This research will be a quasi-experimental design specifically using the pre-test and post-test evaluation of an educational intervention, which in this case is gamification. Pre- and post-test study design has the advantage of directionality due to the testing of a dependent variable (engagement and academic performance) before and after the intervention, the independent variable (online and classroom gamification) (Stratton, 2019).

All students enrolled in the unit will be invited to complete a pre-gamification survey via an email at the end of week 4 as well as a post-gamification survey at the end of week 8. The survey will include the following scales:

- **The Higher Education Student Engagement Scale (HESES)** (Zhoc et al., 2019) is used to measure student engagement (28 items) and consists of the following subscales:
 - **Academic engagement** - This refers to observable behaviours related directly to the learning process. They are the behaviours that are essential to achieve the minimal 'threshold' level of learning.
 - **Cognitive engagement** - This means students who exhibit a desire to go beyond the requirement and a preference for challenge, which facilitate students to extend their frontiers of knowledge and to form meaningful and enduring commitments to their study.
 - **Social engagement with tutor** - refers to the interaction with teaching staff, which takes place in the academic sphere of the institution. There is an abundance of research evidence supporting that student-faculty relationships are critical to the improvement of student learning and development (Guenther & Miller, 2011).

- **Social engagement with peers** - refers to the interaction with friends and peers who offer informal support to students. In fact, peers are considered the single most critical source of influence as they affect almost all aspects of development, including cognitive, affective, psychological and behavioural (Thomas, 2012).
- **Affective engagement** - This relates to a level of emotional response characterised by feelings of involvement in the institution as a place and a set of activities worth pursuing (Finn & Zimmer, 2012). Research into the significance of affective connections at school has examined students' sense of belonging, identification with school and sense of relatedness, which are factors influential to student motivation and participatory behaviours (Appleton et al., 2008).
- **The Gameful Experience Questionnaire (GAMEFULNESS)** (Hogberg et al., 2019) is used to measure an individual user's gameful experience. This is a validated instrument that measures an individual's gameful experience through seven dimensions that collectively describe this experience. These are accomplishment, challenge, competition, guided, immersion, playfulness, and social experience. The instrument consists of 65 items and are scored on a 7-point Likert scale.

Data analysis

Statistical analysis will be performed on the survey data. We will use SPSS to conduct paired samples T-tests to investigate whether there are significant differences between the responses at time 1 (before the gamification is implemented in week 4), and then at time 2 (week 8). Students will also be asked to write a reflection on their gamification experience as part of their group report submission. These reflections will be extracted, and a thematic analysis will be conducted to identify how students perceive their gamification experience in relation to their engagement and academic performance. To prevent students from writing overly positive or insincere reflections, the assessment brief will set clear expectations of the value of honesty and thoughtful evaluation, as well as provide specific prompts/guiding questions that encourage critical thinking by asking students to reflect on both the strengths and areas for improvement in applying gamification in teaching managerial communication. After the debrief of the gamification activities, teachers will also model authentic reflection by leading a discussion on how the participants perceived them and share their own thoughts.

Significance and expected outcomes

Evidence from the literature argues that gamification learning interventions may increase student engagement and enhance learning. When applied effectively, gamification captures the students' interest, and encourages them to engage with online content and classroom activities. Research indicates the positive correlation between engagement and academic performance (Lei, et al., 2018). Gamified learning interventions enhance the learning experience by making students motivated to engage in online and in-class activities. This helps students develop self-regulating behaviours that improve their academic performance. The development of the gamification design principles will help other educators build capacity. Impact will be measured using changes in the student's motivation, engagement, and satisfaction before and after the intervention as well as comparing the assessment results of students in the gamified vs non-gamified environments. Based on the findings, a set of design principles to guide future gamification interventions will be developed. The researchers expect to see improvements in the academic engagement, cognitive engagement, social engagement (with both tutor and peers), affective engagement post-gamification. It is also anticipated that after the gamification weeks, students will exhibit stronger feelings of accomplishment, challenge, competition, guidance, immersion, motivation and learning.

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