

## Game On! Students' Perceptions of Gamified Learning

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### ABSTRACT

Gamification is presented in the literature as a pedagogical innovation that may increase student engagement and enhance learning. This study explores students' perceptions of a gamified learning intervention deployed in a large undergraduate module and a small postgraduate module. Given the dearth of previous empirical work, an exploratory approach was used. Focus groups were carried out to develop a nuanced understanding of the students' perceptions of a gamified learning environment. Six themes emerged: impact on learning outcomes, motivation, the importance of the stakes, group dynamics, gender and the challenges gamified learning activities present. The paper contributes by evaluating students' perceptions of the effectiveness of gamification, providing guidelines for other practitioners deploying gamified learning interventions and identifying outstanding issues and questions that require further research.

### Keywords

Gamification, Student motivation, Student engagement, Active learning, Millennials

### Introduction

The beginning of the 21<sup>st</sup> century has seen several macro-level trends challenge the traditional higher education model (Doyle, Buckley, & Carroll, 2013). Most notable is the arrival of a new generational group (Elam, Stratton, & Gibson, 2007; Howe & Strauss, 2000; Howe & Strauss, 2003). Referred to as "Millennials" or "Generation Y," they are widely seen as being the first "digital natives," exposed to information technology from birth. Other far-reaching changes have coincided with the arrival of this new cohort. Massification, a concept which refers to the enrolment of students beyond the levels required to repopulate academia and certain other high status professions, continues apace (Cornuel, 2007). This inevitably leads to larger and more diverse classes, with far more variance in student background and ability. University financing models are also changing (Altbach, Reisberg, & Rumbley, 2009). Higher level institutions have adapted to the changing financial environment by developing new revenue streams, including fee paying postgraduate and executive education courses, and by recruiting fee paying students from foreign jurisdictions, amplifying the negative effects of massification.

One concern linked to these trends is that student engagement and motivation is declining. The symptoms are well documented. Lecturers report declining class attendance (Massingham & Herrington, 2006) coupled with difficulties in prompting interaction and discussion (Race, 2010). More pernicious problems such as plagiarism and cheating are reported to be rising (Flint, Clegg, & Macdonald, 2006). In response, educators are striving to develop innovative teaching practices to capture and retain the attention of students, particularly millennials. One approach, and the subject of growing interest, is gamification. This involves "*using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems*" (Kapp, 2012, p. 10). More generally, gamification is the term applied to a set of motivational triggers, such as rewards and competition, which are traditionally associated with games. While the application of gamification in education is still an emerging trend (Dicheva, Dichev, Agre, & Angelova, 2015), its proponents suggest that it can be employed to enhance student engagement and prompt learning.

However, due to the dearth of empirical research in this area, little is known about how gamification impacts on students' motivation to engage and learn. For example, in what contexts does gamification have most impact on engagement? Do gamified learning activities work better in large or small classes? Does the level of specialism of the relevant degree make any difference to the effectiveness of gamification in education? What challenges or difficulties do gamified learning environments present for students? When attempting to influence behaviour, a comprehensive understanding of the target group's perceptions of the relevant issue is necessary (Gullifer & Tyson, 2010).

To this end, a gamified learning intervention was deployed within two university modules taken by different student cohorts during the same semester. The first was a large group of undergraduate students while the second

was a small postgraduate course. Focus groups were carried out with each cohort to develop a nuanced understanding of their perceptions of a gamified learning environment across different class sizes, level of education and subject specialism. Our paper makes three contributions. First, we assess students' perceptions of the effectiveness of gamification as a pedagogical technique. Second, we provide other educators with guidance on how gamification can be integrated into curricula. Finally, we use the data to identify outstanding issues and questions that must be fully addressed before gamification can be considered a mature pedagogical methodology. In the following section, we review the relevant literature and identify the attributes of gamified activities. We then describe our research design and data collection method. Our findings are presented before the paper concludes with a discussion of our results and suggestions.

## Literature review

Games provoke powerful emotional responses, such as curiosity, frustration and joy (Kim, 2012). Gamification involves using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems (Kapp, 2012, p. 10). It is often closely identified with computer games. However, gamification does not necessarily involve the use of either an actual game or information technology. Instead, it involves the integration of design elements or activity patterns traditionally found in games into non-game contexts (Simões, Díaz Redondo, & Fernández Vilas, 2013).

The literature identifies a number of common attributes of gamified activities. First, individuals receive rewards for achieving goals or overcoming obstacles. This is operationalized in a variety of ways and may include badges, prizes and levelling systems (Glover, 2013). Badges are used to publicly demonstrate that the player has achieved a particular game objective. Prizes fulfil a similar role, but provide the player with a reward extrinsic to the game. Levelling systems are intrinsic to games, and provide players with increased status, access or power within the game environment (Zichermann & Cunningham, 2011).

Levelling systems are also a key enabler of the rapid feedback cycles that constitute the second feature of gamified activities (Lee & Hammer, 2011). Game playing is associated with trial, error, failure and eventual success through practice, experience, reflection and learning. A key objective is not to forbid failure, but develop a positive relationship with it. Failure is not seen as an end, but as a step on the journey to mastery. Gamified learning interventions seek to maintain a positive relationship with failure by creating rapid feedback cycles and keeping the stakes for individual learning episodes low (Lee & Hammer, 2011). Levelling systems, sometimes referred to as progression stairs, mediate these feedback cycles by ensuring that players interact with challenges and other players at a level commensurate with their own competence (Zichermann & Cunningham, 2011).

Both traditional and video games have objective, specific rules (Smith-Robbins, 2011). Salen and Zimmerman (2004) define a game as *"a system in which players engage in an artificial conflict defined by rules that results in a quantifiable outcome."* (p. 81). Rules structure the activity, and place clear limits on the actions players can take. For example, in poker, rules forbid players from looking at other players' cards. Taken as a whole, the rules define the scope of the game.

A fourth distinguishing characteristic is the explicit use of competition as a motivational tool (Nicholson, 2012). Competition may be generated at an individual level through progress tracking, whereby movement towards an overall objective is mapped by a sequence of intermediate goals to be achieved. It may also be social, with individuals competing against each other to achieve the highest score. This is often operationalized in the form of a leader board, which ranks from first to last in terms of performance (Deterding, Dixon, Khaled & Nacke, 2011). These ranking systems serve as a source of motivation because participants see their efforts publicly and instantly recognised (Dominguez et al., 2013).

In successful gamified activities, the attributes listed previously are not disparate elements, but must be knitted together to create a cohesive whole (McGonigal, 2011). For example, the success of competition as a motivational tool depends on whether the reward system is perceived as credible, transparent, challenging and fair. A transparent reward system depends upon having fair and transparent rules, and so on. Such analysis can be continued ad infinitum, and this web of interdependencies means that designing effective gamified activities is challenging (Lee & Hammer, 2011).

The power of gamification as a motivational tool has led to calls for educators to consider how the concept might be applied in educational contexts (Dominguez et al., 2013; Lee & Hammer, 2011). A literature review of empirical studies on gamification carried out in 2014 concluded that gamification has positive impacts, however

its effects are greatly dependent on the context in which the gamification is implemented and the profile of the users (Hamari, Koivisto & Sarsa, 2014). Gamification has also been criticised within the education literature (see, for example, Glover, 2013). At a philosophical level, one concern is that it may reduce the internal motivation that the user has for the activity in question by replacing internal motivation with external motivation (Nicholson, 2012). The desirability and utility of competition in educational contexts is another open research question (see, for example, Deardon, 1972, and Rich, 1998). Another concern is that gamification may encourage addictive or compulsive behaviour among people with certain personality types (Zichermann & Cunningham, 2011).

More specifically, there have been many calls in the literature for a more nuanced research agenda which examines gamification at a higher level of resolution. Hamari et al. (2014) call for research to investigate the role of context and the qualities and attributes of users when considering gamified learning interventions. Miller, Cafazzo and Seto (2014) echo this call for research investigating how the characteristics of users impact on the effectiveness of gamification. Domínguez et al. (2013, p. 391) are, on the whole, positive about the utility of gamification but point out that “*For many, the system was not motivating.... In some cases the system was even discouraging.*” They call for further research to identify the factors that cause this dissatisfaction.

Before we rush to incorporate gamified learning activities into the curriculum we need to understand its impact on engagement and learning from a student perspective. We also need to understand the contexts within which gamified learning activities work effectively. There is a clear need for a substantial body of further research to investigate these and other issues. Our study contributes to this agenda by conducting exploratory work which draws in the experiences of participants to identify empirically issues and challenges in gamified learning interventions.

## Research design

In order to examine students’ perceptions of gamification, it was necessary to design and deploy a gamified learning activity. The activity used in this study is based on a prediction market (PM). A PM is “*designed and run for the primary purpose of mining and aggregating information scattered among traders and subsequently using this information in the form of market values in order to make predictions about specific future events*” (Tziralis & Tatsiopoulos, 2012, p. 75). In its simplest form, a contract is created whose value depends on a future uncertain event. For example, a manager may wish to evaluate whether a project will be completed on time. A contract is created which returns €100 if the project is completed on time and €0 otherwise. It is offered for sale at €50 (based on an initial 50:50 probability), typically on an electronic market. If market participants believe the project is likely to be completed on time, they will buy the contract causing its price to rise. If they believe the contrary, they will sell the contract, reducing the price. The price of the contract can therefore be used as an estimate of the group’s collective assessment as to the probability of the project being completed on schedule. The literature has previously established the utility of PMs as pedagogical tools that can be used across a range of disciplines (e.g., Buckley, Garvey, & McGrath, 2011; Buckley & Doyle, 2015; Evans, 2012).

This study was based on two modules focusing on the development of technical skills in calculating tax liabilities and students’ general knowledge of the national taxation system. One module is taken by a large third year undergraduate class ( $n = 142$ ) taking a four year business degree, while the other is part of a one year full time graduate degree taken by a small group ( $n = 19$ ) specialising in taxation. In addition to the obvious variance in terms of difficulty level, other differences between the cohorts which bear on the later analysis should be highlighted. Some undergraduate students pay an annual registration fee of €2,500 but otherwise receive free education; many more are covered by various grant schemes and pay nothing. The postgraduate students paid €7,250 for their programme. The undergraduates undertake paid work experience for 9 months directly after the semester in which the module is taken (called “co-op”). One of the key features of the postgraduate programme is that it offers numerous exemptions from the professional exams of the relevant national tax institute, assuming students attain sufficiently high grades.

In addition to developing technical skills in calculating tax liabilities, a learning outcome of both modules is that students develop their knowledge of how national taxation policy is developed and implemented. In order to meet this learning outcome, a tax PM was developed and deployed in both modules, with 10% of a student’s final grade being determined by their participation and performance. The Minister for Finance annually announces a range of tax policy decisions as part of the National Budget. The National Budget Forecasting Project (NBFP) required students to forecast what measures would be introduced in the forthcoming budget.

This was operationalized by providing students with a question such as “*The national budget will alter capital gains tax as follows:*” and a range of options:

- No change to the current operation of capital gains tax;
- Rate changes to between 25% and 30%;
- Rate change to over 31% ;
- Capital gains taxed at tiered rates of between 25% and 40%.

Students were given €5,000 in virtual cash when the market opened. They used this to invest in the outcome they considered most likely for each question (the contract). Three questions were originally posted. Additional questions were added randomly over three weeks so that over the course of the project, students could trade on the potential outcomes of 14 questions. They were also required to provide a narrative justification for each trade to evidence rational decision making. The NBFP was designed to prompt students to search for information about the budget from sources such as news media, governmental and NGO reports and position papers and recommendations from consultancy firms. Reading and analysing these should improve students’ general knowledge of tax, tying the activity back to the learning outcome. Grant Thornton sponsors the NBFP by paying for the relevant software license and by offering prizes from €500 to €100 for the top student performers, adding financial motivation. 161 students traded on the NBFP market. Students were free to trade at any stage throughout the three week period of the market. Over that period, students made an average of 48 trades. Each trade represents a student making or adjusting a forecast.

The PM encompasses all the elements of gamification. Implicit in the concept of market driven forecasting systems is the concept of an individualised reward. First, when participants correctly forecast future events they receive virtual cash increasing their portfolio value and their project grade. There was also a financial reward associated with the top performances. Second, PMs provide rapid feedback. At any point, the market price represents the consensus of all participants as to the probability of the relevant event occurring. A participant can therefore compare his/her personal estimates to the estimates of the entire class. Unlike a poll, a participant is not limited to making a single estimate. He/she can change decisions at any time in response to feedback or newly revealed information by buying or selling contracts. Third, at an operational level, students have a limited set of options. Contracts can be bought or sold. The complexity of the system arises from information aggregation and the repeated interactions of large numbers of traders. Finally, PMs are competitive; individuals can be ranked in terms of performance by comparing their portfolio values.

## **Research method**

The aim of this study was to explore students’ perceptions of the gamified learning intervention outlined above. The most appropriate methodology was therefore to conduct focus groups. Focus groups originated in the 1920s in the area of market research but are currently a popular method of data collection in many fields (Robson, 2002). A focus group involves a group interview on a specific topic – namely, the “focus.” The idea is that people known to have had a certain experience can be interviewed in a relatively unstructured way about that experience (Bryman & Bell, 2003). Typically these open-ended group discussions are facilitated by a moderator and take at least an hour (Robson, 2002). The optimum group size is usually considered to be somewhere in the range from 8 to 12 participants (Stewart & Shamdasani, 1990).

Because of the number of participants involved in a focus group, a wide variety of viewpoints and ideas may emerge on any one issue, thus helping to explain or explore concepts (Saunders, Lewis & Thornhill, 2009). Individuals contributing to the discussion will often argue with each other and challenge each other’s views. This process causes more realistic accounts of people’s thoughts to emerge, because they are forced to think about and possibly revise their views (Bryman & Bell, 2003). Furthermore, participants tend to act as a moderating influence on each other so that extreme views are weeded out (Robson, 2002). The interaction of the group thus leads to a highly productive discussion which leads to a rich flow of data (Saunders, Lewis & Thornhill, 2009). The focus group approach therefore facilitates an observation of the ways in which individuals collectively make sense of a phenomenon and construct meanings around it (Bryman & Bell, 2003), making it an ideal research method for this exploratory study.

As participants in the gamified learning intervention, students’ expert knowledge, experience and perceptions are essential to advancing our understanding of the pedagogical impact of gamified interventions. Following research ethics approval, a focus group topic guide was developed. This followed a semi-structured, open ended format, and was developed using guidelines suggested by Wilkinson (2008). A series of open ended questions were developed to prompt discussion. The primary concerns with focus group methodology centre firstly on the

ability of the moderator to manage and facilitate the group discussion, including encouraging involvement from all participants, and secondly, on the manner in which the data is recorded (Robson, 2002). In order to address these concerns an external moderator, highly experienced in focus group methodology, was recruited to conduct the focus groups. Independence meant the moderator was, and was perceived by the students to be, completely unbiased and unconnected with the learning intervention.

After the teaching semester concluded, all students in both relevant modules were sent an email inviting them to participate in a focus group discussion. Involvement was incentivised by offering participants university book store vouchers and refreshments. All students who volunteered to be involved were accepted into the study. Two separate focus groups were held, one for each of the two cohorts described in the research design section. The first group (F1) consisted of 13 business undergraduates (total class = 142). Six of this group were female and seven were male with the age range being between 20 and 24. The second group (F2) consisted of 9 postgraduate students (total class = 19) - five females and four males aged between 21 and 38 (one mature student represented a slight outlier in terms of age with the other 8 students being under 27). Each focus group lasted for just under 90 minutes. In line with best practice, both focus groups were recorded to ensure all data was accurately captured. During focus groups, students were engaged in a funnelled conversation beginning with general views of learning, moving to their perceptions of the PM, and finally involving in-depth discussions around the idea of learning through a gamified platform.

After data collection, the audiotapes were converted into verbatim transcripts before coding and analysis. The transcripts were read and reread to develop a full understanding of the discussions. The analysis focussed on identifying the key themes emerging. Unique topics were assigned a code, and analysis continued until no new categories emerged. Patterns and commonalities among categories were then identified and grouped into higher order themes. Once this was completed, transcripts were interrogated again with reference to the identified themes.

## Research findings

Six themes emerged: learning outcomes, motivation, perceived stakes, group dynamics and gender, and challenges. Each is discussed below.

### Learning outcomes

The undergraduate group displayed a greater understanding of the key aims of the activity and the lessons from it. First, they took the central message from the exercise to be a wider understanding of how the real world (as opposed to theory) operates, rather than anything tax specific, though some also acknowledged that their general tax knowledge had been enhanced.

*It might make you understand the reasoning why certain things are done in the budget. Before this, I used to look at it and go "why did they bring that in? It doesn't make any sense." But when you have to do the research behind it, you're going "OK, that's obviously going for a certain element that they're changing for this reason." UG*

The postgraduate group displayed a more myopic attitude towards the project. They felt it was irrelevant for future tax professionals and better suited those aspiring to a career in trading. They failed to see a link between the assignment and the learning outcomes, and instead focused on the mechanics of trading. When the purpose of the assignment was pointed out by the moderator, they grudgingly saw the relevance; however they had a negative emotional response to the project.

*Well I personally think it had no use being in the Masters of Taxation, because working in practice, we're never going to be on stocks, making trades or buying stocks. PG*

Most students felt the project altered their information consumption habits. The budget is covered extensively in the media in the run up to budget day. Some students actively sought out new information sources.

*Well you looked for specific information relating to the question. PG  
...everyday it was a specific thing, like on VAT or income tax bands or something, you had to go tearing off to find out that area and come back with the answer and make a call on it. UG*

Others reported that the project caused them to attend in a more focused way to information sources they would usually encounter. The undergraduates reported reading more than they would have otherwise.

*I looked up loads that I wouldn't have been bothered with before. UG*

The postgraduates felt they did not read any more than they would have, mostly due to being at absolute capacity in terms of workload.

*You didn't have time to be setting aside... because you'd so much other things going on, that you couldn't let your other stuff suffer because of it. PG*

Participants identified two other key learning outcomes. First, they felt the project emphasised that real-world problems may not have predictable answers. A PM requires students to forecast inherently uncertain future events. The undergraduates recognised and appreciated this uncertainty. The postgraduates recognised that there was no right answer to the exercise, but were frustrated rather than intrigued by this.

The undergraduates also felt that the project illustrated herd mentality and group dynamics. Participants learned that the market could be influenced by the predictions of early movers. They appreciated that, crudely, it was a popularity contest for opinions. The undergraduates felt the market mechanism illustrated how group consensus can be manipulated and/or wrong, a valuable lesson in a business context. They appreciated this.

*...if you wanted the market to move in a certain way, all you'd to do was Google and find the thing that would support your argument and then the sheep effect would just kick in. UG*

The postgraduate group did not display such learning.

## **Motivation**

The second theme was the impact the gamified intervention had on motivation. Here again there was a clear divide between groups, with the undergraduates being more favourably disposed towards the competitive element.

Students who were positive about competition commented favourably on a number of items. They liked the ranking system. They enjoyed seeing themselves climbing past “the competition” as the project progressed. As the ranking was visible to all, there was an extrinsic competitive motivation, where achievement was experienced because of relative positioning.

*I was monitoring my position the whole way along and that's what was motivating me. UG*

Another motivation was the internal satisfaction of being able to “beat the system.” Students enjoyed learning how the market worked and could be influenced. Some attempted to manipulate others by posting misleading comments when they rationalised trades. They found the process of developing a strategy to allow them outsmart others rewarding. These students engaged in market manipulation in order to “win” but enjoyed the aspect of manipulation at an internal level.

*There was one question where I was the very first buyer on it and, you're going to hate for me this, I bought a hundred shares in what I knew was going to be wrong, so people would see that spike in price. They all bought after me, sold them out and I probably screwed over about 20 undergrads. PG*

However, not all students were favourably disposed towards the competitive elements of the project. In particular, the majority of the postgraduates did not enjoy the competition.

One of the clear motivating factors for those who enjoyed the project was its novelty. For the undergraduates in particular, it represented a welcome break from the traditional learning activities they encountered.

*When a new question came out, everyone was rushing to their phones and stuff and you were kind of obsessed by it and you wanted to do really well. UG*

*I think there was more of a “want” to do it, as opposed to a “need”... There was definitely an element of fun to it. UG*

Many of the undergraduates were also motivated by the project’s real-time nature. They made a distinction between “time” and “timing.” Many took the view that it was not time consuming but about working smarter not harder. The undergraduates considered the project “always on,” but not a significant drain on time.

*...the fact you could do it any time like, it was on your phone, so if you were just for instance on a bus or anything, you could just check it up... UG*

The postgraduates agreed with the novelty of the approach. However, they found it frustrating to shift learning modalities during what they considered a very full schedule. They preferred to manage their time in blocks, planning in advance, and the PM did not fit this model.

*There’s too much time gone into it for the 10%. PG*

Many students were motivated by the financial prizes. They are accustomed to college work being something that has to be done to get good grades. The notion that it might be financially rewarding was both novel and motivating.

*...the main motivation was money. If the money was not there I don’t think I would have spent so much time on it. PG*

That said, the strength of the motivation was reduced by the calculated chance of success. Given the number of students involved, the statistical possibility of winning was under 10%. The greater the pool of possible winners, the less “real” the financial motivation was.

### **Perceived stakes for students**

Consideration of the perceived stakes emerged as the single most important determinant of the suitability of gamification for a learning context. One of the major items highlighted repeatedly was the difference in the undergraduate and postgraduate perceptions of the project. The explanation emerging from discussions was the higher the stakes, the less open students were to a gamified approach.

The postgraduates look at their degree as a transaction. They pay approximately €7,250 and in return (as they see it) they are educated to a level where they earn significant professional exemptions and become more attractive entry level employees. Anything connected with exemptions gives rise to high stress levels. Many feel that without exemptions, the qualification is meaningless so stakes are high.

*Well you’re after paying that much money, you’d want to get your exemptions, because if not it’s really you’ve just wasted €7,000 on this course. PG*

They want the best possible chance of maximising marks in exemption driven modules. As such they are looking for three things in assessments; direct relevance to their future career, ease of completion and a way to maximise marks. The uncertainty associated with the PM does not represent the best opportunity to maximise marks. As the stakes were higher for them (in their view), they considered it unfair that they were assessed on a volatile “game.”

*So say you lost a load of money in shares that you bought, so that means you could have lost an entire 5%, so I think that was an awful lot to lose in an exemptions module. PG*

The undergraduates did not share that view. They were studying a general degree likely to contain elements they have no interest in. They could, therefore, appreciate how interesting subject matter can be in a gamified mode. While the purpose of college for them is to secure employment, this is not as specific, imminent or transactional. They are learning wider academic and life lessons and are less pigeon-holed, giving them a less focused view. As a result, they are under less pressure than the postgraduates in three ways. First, they have less intense course work (in both their viewpoint and that of the postgraduates). This prevented them from seeing the PM as being a disproportionate level of work. Second, they had not framed their degree programme in a transactional manner. They did not have the feelings of entitlement that the postgraduates did because they had not paid as much

money. Third, they were not as close to imminent employment and their proximity to co-op placement allowed them to feel there are strong prospects of eventual employment. In short, the fact that they were at a more general level of study with less at stake allowed them to gain more from the project.

### **Group dynamics and gender**

Group dynamics were important. Discussions suggested that gamification worked better in larger, more anonymous groups where a close dynamic is not upset by competition. Some of the problems the postgraduates had stemmed from this. As a small class they typically studied and socialised together. Their closeness made them uncomfortable with the explicit competitive element of the project. The undergraduate class was larger, and lacked a common identity. This environment reduced the cognitive dissonance of competing with peers.

Gender differences also emerged as an issue. There was a definite gender difference observed in the focus groups.

*Well men are more competitive...they definitely prefer gambling, yeah. PG*

While the sample was not large enough to make accurate assumptions in this regard, it was observed that the motivating nature of the competitive element was more strongly emphasised by the male participants. This is an aspect of gamification worthy of further study.

### **Challenges**

In order to inform future deployments, we investigated the challenges presented by the gamified activity. There was a sense from all participants that gamified interventions would not suit traditionally bookish students, due to the lack of “correct” answers and the proximity to the real world.

*Well I hang out with two girls and they were annoyed all the way through it...they are perfectionists and they could not get a handle on this because it came down to having fun, you know participating. They just couldn't do it, they hated it. UG*

*It gives people who might not be good at like essays, you know, the typical learning, it gives them a chance to actually engage. PG*

A key challenge in designing competitive learning interventions is to ensure that motivation does not ebb because of competition. For students who did not begin well and were ranked towards the bottom early, motivation quickly decreased. In a gamified learning environment, students need to feel “in touch” with the leaders on the score-sheet in order to remain motivated.

*...if you knew you weren't doing well earlier on, you kind of lost the motivation to stay going because you knew you weren't going to get the right high marks. PG*

### **Conclusions**

The study described in this paper had three objectives. Our first concern was to investigate students' perceptions of the effect of gamification. Our research suggests that the effect is contextual. In a large undergraduate module taught as part of a general business degree, the gamified intervention engaged students because of its novelty and increased student motivation by introducing competition and rewards. This cohort learned how tax policy works, sought out new sources of information and employed strategy to enhance their performances. They also learned to appreciate the dangers of herd mentality and the fact that there isn't always a correct answer in a real world context. Students in a small class undertaking a postgraduate module on a specialised programme did not achieve the same level of learning. They were frustrated by the gamified activity because they considered the stakes to be too high to engage in game playing, particularly in the context of a heavy postgraduate workload. This caused a negative response to the PM and a very myopic view of the learning outcomes it aimed to deliver. There does seem to be a perception that males were more engaged in the market, though it should be noted that the overall winner of €500 was female. The project also seemed to suit less bookish students better and most of the prize winners were not in the top group of academically performing students.



Our second goal was to provide guidelines for other practitioners in designing and implementing gamified learning interventions. Our study shows that the following factors need to be carefully considered:

- Class size (small, close-knit classes may not be as motivated by competition as large groups, however in large classes, not being within sight of the leaders may demotivate);
- The stakes involved (this might include whether students are undertaking an undergraduate or postgraduate programme, whether there are fees or professional exemptions involved, the workload of the students etc.);
- Whether the module is part of a general degree with broad learning outcomes or a specialist programme with specific learning outcomes (gamification may work better in introductory learning environments);
- What other teaching and learning approaches are being deployed to suit different learner types (gamification may suit some learners better than others so a broad range is needed);
- The nature and visibility of rewards (grades, leader boards, prizes) and understanding the potential motivation drop off points when students lose sight of the rewards;
- The key learning outcomes that the educator wants students to achieve (technical content, strategy, real world context, experiential learning, etc.).

Gamification is a novel concept in the higher education domain. While appearing to possess great potential as a pedagogical methodology, there are undoubtedly issues that should be studied in more detail before definitive conclusions can be drawn. Our third contribution is to begin to identify issues and questions that merit further study. Our research shows that context is a crucial determinant of the success of gamification. Factors such as class size, educational level and perceived stakes influence its effectiveness. Identifying the absolute effect of these factors, as well as other relevant contextual variables, would result in more optimal deployment of gamification in a higher education context. This research also suggests that gamified learning interventions suit some students and their learning styles better than others. Investigating and mapping this effect would facilitate gamification being used as part of a suite of learning interventions that deliver improved outcomes for all learners.

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