GAMIFICATION IN HIGHER EDUCATION – STUDENTS AND ACADEMICS INTEREST IN GAMING

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Abstract
Gamification is defined as the use of game design elements in non-game contexts and aims to change the behaviour of a user by enhancing motivation and hence participation in an activity. In a higher education (HE) context, the literature indicates that gamification can enhance student engagement and learning. This work used a survey to determine technology use and gauge opinions of gamification among academics (n=80) and students (n=73) within a London university. The results indicate a majority of both students and academics showed a positive interest in gamification but this was more pronounced in students. A majority of academics and students showed an interest in the use of online learning communities, virtual rewards, competitions and challenges and unlocking learning levels. While most academic staff were interested in gamification only a minority thought it would lead to improved learning and student grades while a majority of students thought this. There was no significant difference in interest in gamification based on age or gender but some ethnicity specific differences were observed. These findings indicate there is an interest in gamification in academics and students but for it to be adopted we need to address the disconnect between students and academics, to take cultural differences into account when designing gamified activities and provide an adaptable learning environment that suits the preferences of students.

Keywords: Gamification, technology-enhanced learning, online learning, motivation, survey.

1 INTRODUCTION
In recent years there has been an exponential increase in the number of publications on ‘gamification’ in teaching and learning. Clearly, there is a need to evaluate and use this increasing body of knowledge on gamification in HE to determine best practice for its use in technology-enhanced learning (TEL).

Deterding et al., (2011) have defined gamification as ‘the use of game design elements in non-game contexts’. Gamification can take a number of forms, for example the use of completion bars which fill as more tasks are completed taps into an intrinsic need to see completion. Games mechanics often use ‘currency’ or something of value that can be counted and a system to observe progress against clear goals. These may be elements such as status bars, leader boards, accumulation of virtual trophies or badges, rewards or progressing through a series of levels, all of these are used in the design of computer and video games. A further element is the idea of a community where users can co-operate. The aim here is to encourage longer term adherence to learning activities and to transfer the productivity and engagement achieved when playing games, into the classroom.

In higher education, some attempts are being made to transform assessments into challenges, provide rewards for persistence and provide a space for leaders to emerge. One example comes from Kaplan University who gamified their IT programme, it was observed that student grades improved by 9% and there was a 16% reduction in course failure (Johnson et al., 2014). Current evidence suggests that gamification has a positive effect on learning but this is dependent on how it is used and the users themselves (Hamari et al., 2014). In a review of the literature Stott and Neustaedter (2013) indicated the most successful game design concepts were freedom to fail, rapid feedback, progression and storytelling.

A desirable facet of providing a gamified learning experience is that it can provide opportunities for continued practice in an activity. Failure, or put another way not succeeding quite yet is integral to the process and there is a need for instant and constructive feedback. From this feedback, students should be able to change their approach to the task so that it can be completed or get closer to completion. This presents a challenge to the design of tasks as they need to be aligned to the user’s skill level; anything that is too easy or too difficult may be off putting and discourage engagement. McClarty et al., (2012) makes the point that this bears a resemblance to Vygotsky’s zone of proximal development “the distance between the actual development level as determined by independent
problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 2006). Games should provide the guidance to support the progression of the user. Progression is a key element of many games in the form of levels or missions and its use in education is seen as a means to organise information into distinct sections and to order events into a particular sequence to increase engagement (Stott and Neustaedter, 2013). The use of storytelling or narrative can help unify learning elements and place them into a realistic context (Stott and Neustaedter, 2013).

The engagement of users with online learning has been studied in terms of the concept of persuasive technology (Muntean, 2011). This comprises three components, motivation, triggers and ability. Changes in behaviour will not occur if there is a mismatch between the ability of the user and the task offered. Triggers i.e. something which engages a user to get them to complete a task are connected to motivation. Individuals have their own likes and dislikes and preferences which are associated with different motivational triggers and in addition there may be differences associated with age, gender, ethnicity and culture. What this means is that different types of activity will illicit different sorts of responses in individuals. This appears to provide a problem for the design of gamified activities as this could backfire and leave some users unengaged. The purpose of gamification is to encourage participation and hence its effects on learning are indirect. Therefore, in order for gamification to be a success in HE we need to focus on what factors motivate and trigger participation in students and provide a system that attempts to be as inclusive as possible and to examine the opinions of academics in developing and providing gamified learning activities. In this regard there have been no prior studies examining the potential interest of students and academics in the use of gamification in HE, and their opinions on its impact on grades, nor an analysis of any potential differences in gamification based on particular demographics or interests.

Students have their own preferences which are shaped by their culture and prior experiences as well as the situation in which learning takes place (Lave and Wenger, 1991). With this in mind, the purpose of this research was to determine what academics and students think about the use of gamification in higher education and if there are significant differences in particular subsets of academics and students in the attitudes towards, and preferences for using gamification within teaching and learning.

2 METHODOLOGY

The approach was to perform an exploratory cross-sectional survey within a London university using an online questionnaire. Both academics and students were targeted and separate surveys were prepared for each group. Ethical approval for the survey was granted by the University Research Ethics Committee.

The surveys collected demographic data and information including subject area, use of social media and computer games and prior knowledge of gamification. Questions on interest in different types of gamification tools (Tables 1 and 2) used a 4 or 5-point rating scale.

Cross-tabulation analysis within IBM SPSS was used to identify statistically significant correlations between subgroups including age, gender and ethnicity and responses to specific questions which included those attitudes towards different elements of gamification. As the cross-tabulation analysis usually generated data cells with a count <5 the Likelihood Ratio was used in preference to the Pearson Chi Square test to determine goodness of fit. Using this test, a significance value of <0.1 indicated statistical significance and that the null hypothesis was rejected.

3 RESULTS

3.1 Demographic and behavioural data

The demographics of the student responders (n=73) showed that 51 (70%) identified as female and 20 (27%) male, 37 (51%) were within the age range 18-21 years and 15 (21%) 22-25 years. Ethnicity was as follows: 28 (39%) White; 22 (30%) Asian; 9 (12%) Black; 5 (7%) Mixed and 6 (8%) ‘Other’. Compared to the university demographics this indicates that females were overrepresented and males underrepresented in this study but the age and ethnicity of responders broadly matched those within the university.
In this study population 59 (81%) of students used social media and 42 (71%) of these used it for both personal and professional purposes but none used it only for professional reasons. 41 (56%) of students played computer games on a regular or semi-regular basis.

Of academics who took the survey (n=80) 46 (58%) identified as female and 31 (39%) as male and 76 (90%) as White. The age range of responders was as follows:

- 21-30 years 4 (5%)
- 31-40 19 (24%)
- 41-50 18 (23%)
- 51-60 26 (33%)
- 61 and over 13 (16%)

Comparison with university data indicates that females were overrepresented and males underrepresented in this study but the age and ethnicity data was broadly representative.

Of the academics who responded (n=76), 39 (51%) used social media and of these 12 (31%) used it for personal use only; 7 (18%) used it for professional use only and 20 (51%) for both social and professional use. 28 (37%) of academics played computer games either regularly or semi-regularly (n=75).

### 3.2 Student and academics attitudes towards, and preferences for, gamification activities

Students were asked a series of questions which aimed to explore their opinion on different aspects of gamification in TEL. These included the ability to interact with a community of learners when engaged in an activity, the use of competitions and challenges with other users, the accumulation of virtual trophies or badges, and the use of learning levels which need to be unlocked in order to progress (Table 1).

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>if they could interact with a community of learners?</td>
<td>10 (14%)</td>
<td>38 (54%)</td>
<td>18 (26%)</td>
<td>3 (4%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>if they included competitions and challenges with other users?</td>
<td>21 (30%)</td>
<td>33 (47%)</td>
<td>8 (11%)</td>
<td>5 (7%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>if they could accumulate virtual trophies or badges?</td>
<td>12 (31%)</td>
<td>15 (38%)</td>
<td>10 (26%)</td>
<td>2 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>if they contained different levels of activities which can be unlocked?</td>
<td>19 (27%)</td>
<td>34 (48%)</td>
<td>12 (17%)</td>
<td>5 (7%)</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

The responses indicate a positive response towards all of the gamification activities suggested with a range 68-77% agreeing or strongly agreeing that they are interested compared to 5-11% disagreeing or strongly disagreeing.

Similar questions were asked of academic staff although a 4-point rating scale was provided in this case (Table 2). A majority of academics were interested or very interested in all of the gamification activities (range 54-69%). However, in this case the lack of a ‘no opinion’ option and different phrasing of the answer options makes it difficult to compare these results directly with those of students. It seems that while a majority of academics and students showed an interest in the use of gamification it seems to be more pronounced in students. The use of a 4-point scale would have the effect of forcing an opinion on the responder, in this case this has not impacted on the number of responders answering the question.
Table 2. Academic preferences for different gamification activities.

<table>
<thead>
<tr>
<th>Question</th>
<th>Very interested</th>
<th>Interested</th>
<th>Vaguely interested</th>
<th>Not interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff interest in use of online communities in online learning</td>
<td>19 (26%)</td>
<td>20 (28%)</td>
<td>24 (33%)</td>
<td>9 (13%)</td>
</tr>
<tr>
<td>Staff interest in use of competitions and challenges in online learning</td>
<td>13 (18%)</td>
<td>32 (44%)</td>
<td>13 (18%)</td>
<td>14 (19%)</td>
</tr>
<tr>
<td>Staff interest in using virtual trophies or badges</td>
<td>10 (14%)</td>
<td>31 (43%)</td>
<td>15 (21%)</td>
<td>16 (22%)</td>
</tr>
<tr>
<td>Staff interest in online learning using levels that can be unlocked</td>
<td>22 (31%)</td>
<td>27 (38%)</td>
<td>14 (19%)</td>
<td>9 (13%)</td>
</tr>
</tbody>
</table>

It was of interest to determine if students and academics thought that using gamification activities would lead to increased motivation to study and thus better grades (Table 3). 55% of students agreed or strongly agreed with this compared to 38% of academics while 17% of students and 20% of academics disagreed or strongly disagreed. There was a pronounced difference between the numbers of academics and students who are ambivalent towards, or unsure of, gamification in higher education with the former significantly greater than the latter.

Table 3. Academic and student opinion on the impact of gamification on student performance.

<table>
<thead>
<tr>
<th>Would students work harder and get better results if their learning was made more game like?</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>15 (21%)</td>
<td>24 (34%)</td>
<td>20 (28%)</td>
<td>7 (10%)</td>
<td>5 (7%)</td>
</tr>
<tr>
<td>Staff</td>
<td>7 (10%)</td>
<td>20 (28%)</td>
<td>30 (42%)</td>
<td>7 (10%)</td>
<td>7 (10%)</td>
</tr>
</tbody>
</table>

Cross-tabulation analysis of student and academic data revealed no clear differences in gamification preferences and attitudes on the basis of age or gender. However, looking at student ethnicity data revealed a preference by Black and Asian students for the use on online learning communities. This was shown to be significant by the Likelihood Ratio (Table 4). Analysis of the other gamification activities revealed no significant association by ethnicity.

Table 4. Correlation between ethnicity and preference for the use of learning communities in gamification activities.

<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>1</td>
<td>16</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Black</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Mixed</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Information refused</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>White</td>
<td>3</td>
<td>10</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>38</td>
<td>18</td>
<td>3</td>
<td>1</td>
<td>70</td>
</tr>
</tbody>
</table>

Likelihood Ratio 0.085

There was a significant association between students who play computer games (gamers) and a preference for activities which involve the use of competitions and challenges when compared with
non-gamers (data not shown) and while overall there was an association between gamers and an opinion that gamification activities would have a positive effect on their education this did not reach significance. Comparisons of student preferences for gamification revealed no significant differences when comparing STEM and non-STEM courses (data not shown). However, there was a significant correlation between academics who played computer games and a positive opinion about gamification activities when compared to non-gamers (Fig 1).

Fig 1. Comparison of computer gamers and non-gamers and their opinions on the overall impact of gamification on learning and academic performance of students. Likelihood ratio, students 0.137, academics 0.026.

Students and academics were requested to leave comments on the use of gamification in HE and representative comments are provided (Table 5).

Table 5. Representative free text comments on gamification provided by students and academics.

<table>
<thead>
<tr>
<th>Student</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>The concept of a reward at the end of every task would fuel concentration and activities, and would be effective towards engaging attention and integration with the subject/course at hand.</td>
</tr>
<tr>
<td>Student</td>
<td>The competition aspect of gamification is quite rewarding; I like to challenge myself to be my best, so if there was a leaderboard of top 50 on my course I would work even harder.</td>
</tr>
<tr>
<td>Student</td>
<td>As student life is complicated and diverse, I think the initiation of gamification will have positive effect on the learning process for assessment and examination.</td>
</tr>
<tr>
<td>Student</td>
<td>Gamification is good at breaking down learning into manageable chunks and offering extrinsic rewards for completion</td>
</tr>
<tr>
<td>Student</td>
<td>For me, already highly self-motivated, I feel that adding a competitive and/or gaming element would add an extra layer of stress that I do not have when simply working through assignments. I can see how it would work for other types of learners though, as long as it does not veer into patronising &quot;educational fun.&quot;</td>
</tr>
<tr>
<td>Student</td>
<td>Good idea, but education should be main focus for ideas like this. Gamification would be fun to an extent, but nothing too overboard.</td>
</tr>
<tr>
<td>Student</td>
<td>I think it is a great idea and although I haven't encountered it before, I am very interested now. I hope this type of learning is implemented in the university and rather sooner than later. It is great because the active interaction and the rewards could make the experience of learning more enjoyable and exciting, something that cannot be achieved with a passive form of learning like reading a book because even if the book is well written, it is not as thrilling like a game which also educates.</td>
</tr>
<tr>
<td>Student</td>
<td>I think the use of gamification in education purposes will be somewhat helpful but it depends on the individual.</td>
</tr>
</tbody>
</table>
We need to be careful that we do not drop any academic rigour and that we make sure the ‘games’ are aligned with the learning outcomes and do not become the ‘reason’ in themselves. This has to remain supplementary to the overall provision.

Gamification is a device for weaker (=not self-motivated) students. While we need to cater for them, we should not forget the learning tasks that lead to deeper understanding. Gamification has potential, but it can also become the equivalent of X-Factor, thus damaging in the long run.

This would be helpful for some aspects of learning. I think the quality of play without ‘winners and losers’ is also very important in a communal, collaborative way too. Some students feel very intimidated in a competitive arena so the games would need to be well designed to encourage all to take part. I think puzzles are a great way of helping students gain confidence in applying problem solving skills.

Not appropriate for fashion students. It does not encourage them to grow up and take responsibility - which is getting more difficult to persuade them to do year on year.

If I had wanted to teach via games, I would have chosen to become a primary school teacher. As it is I teach adults who, I hope, are mature enough to understand that language learning involves some hard work which should not be disguised by fun and games to make it palatable. How sad if only the promise of a reward would get adults to work hard.

Students have different learning needs and styles but anything that can motivate them to engage with their learning should be encouraged. Students engage with the VLE at different levels so we need to ensure that whatever we do engages all students. Linking to assessment is key to engagement.

4 CONCLUSIONS

The results of the study highlight some key differences between academic and students in their use of and attitudes towards technology in teaching and learning and beyond. For example, 81% of students use social media compared to 51% of academics and 56% of students play computer games compared to 37% of academics. This perhaps reflects a long standing ‘generational gap’ whereby younger people tend to be earlier and more passionate adopters of new technology (Rogers, 2003).

Attitudes towards gamification among academics and students showed a number of broad similarities. The use of an online learning community was seen as positive by a greater proportion of students with 68% of students and 54% of academics agreeing or strongly agreeing. More favourable still was the use of competitions and challenges with 77% of students and 62% of academics providing a positive response. Most favourable of all was the use of levels of learning, material that is otherwise hidden and is unlocked following successful completion of a task or activity. A positive response was recorded for 75% of student and 69% of academics. This indicates that in the design of gamified activities, those involving competition and communication/cooperation appear to be the most desirable.

While there was a positive response for individual elements of gamification among both staff and students the key question was their overall opinion on whether or not this would translate into improvements in learning and grades achieved? Here there was a discrepancy between staff and students. While 55% of students thought this approach would have a positive effect, only 38% of academics thought the same. Review of some of the comments in Table 5 explores this further. Academic comments included points that gamification is not likely to have universal appeal, is not applicable for some types of assessments or measuring some learning outcomes, is aimed at non-motivated and weaker students and it does not encourage a sense of professionalism or real-life responsibility. While there were some comments that were positive the majority of academic comments were cautious towards gamification. On the other hand, student comments were largely positive.

From the study data it seems that most students are supportive of at least some elements of gamification and see it having a positive effect on their learning. The situation is slightly less clear with academics, although appearing to be supportive overall (but a lesser degree than students), academics did not think that gamification would translate into improved performance and there are academics who have strong negative views on this approach.

Ethnicity data revealed some variations in interest in gamification. Among students with a Black or Asian ethnicity there was a positive response to the use of online learning communities. To my knowledge there have been no studies examining ethnicity and an interest in and use of gamification. However, there are a number that have examined the relationship between online learning and

| Academic | We need to be careful that we do not drop any academic rigour and that we make sure the ‘games’ are aligned with the learning outcomes and do not become the ‘reason’ in themselves. This has to remain supplementary to the overall provision. |
| Academic | Gamification is a device for weaker (=not self-motivated) students. While we need to cater for them, we should not forget the learning tasks that lead to deeper understanding. Gamification has potential, but it can also become the equivalent of X-Factor, thus damaging in the long run. |
| Academic | This would be helpful for some aspects of learning. I think the quality of play without ‘winners and losers’ is also very important in a communal, collaborative way too. Some students feel very intimidated in a competitive arena so the games would need to be well designed to encourage all to take part. I think puzzles are a great way of helping students gain confidence in applying problem solving skills. |
| Academic | Not appropriate for fashion students. It does not encourage them to grow up and take responsibility - which is getting more difficult to persuade them to do year on year. |
| Academic | If I had wanted to teach via games, I would have chosen to become a primary school teacher. As it is I teach adults who, I hope, are mature enough to understand that language learning involves some hard work which should not be disguised by fun and games to make it palatable. How sad if only the promise of a reward would get adults to work hard. |
| Academic | Students have different learning needs and styles but anything that can motivate them to engage with their learning should be encouraged. Students engage with the VLE at different levels so we need to ensure that whatever we do engages all students. Linking to assessment is key to engagement. |
ethnicity and I will draw upon some of these here. However, most of these studies were performed outside the UK and so there will be myriad of different cultural factors beyond ethnicity that make it difficult to compare study groups in different countries. While some have asserted that technology is culturally neutral, facilitating its use in a wide range of settings there are others who draw upon notions of situated learning and social constructivism to attest that all learning is influenced by cultural and social factors (Lave and Wenger, 1991; Keengwe et al., 2014; Tusting and Barton, 2006).

Differences in socio-cultural learning among ethnic groups may explain variations in preferences for online learning and gamification. Among Singaporean students, Fang (2007) describes three levels of culture that may influence their enjoyment and perceived usefulness of online learning, a national culture based on the environment in which they live, an ethnic culture based on their Chinese origins and cyber culture, based on engagement with digital technologies. All three of these cultures have some impact on attitudes and experiences in online learning (Fang, 2007). There is some conflict in the literature on the relative motivation towards online learning in different ethnic groups. In research on the use of online, asynchronous discussion boards where social interactions can be established outside of real time and at the required pace of the user, Biesenbach-Lucas (2003) suggests that this method is beneficial to non-native speakers as it helps to facilitate assimilation of course content. Additionally, it is seen as helpful in those lacking confidence or ability in the language of instruction (Thompson and Ku, 2005). In contrast, in a study of perceptions of online learning comparing White Americans and their African-American counterparts, African-Americans did not like asynchronous learning compared to White Americans (Ashong and Commander, 2012). The reason for this difference may be because African-American students may not have the language difficulties outlined in other studies and this difference may instead be due to differences in culture or learning-style (Ashong and Commander, 2012). There have been a number of studies that have reported how cultural orientation affects motivation and preferences towards online learning (Ke and Kwak, 2013; Lim, 2004; Macfadyen, 2008; Uzuner, 2009). This all indicates the importance of cultural sensitivity in the development of gamified learning tools but this may be a useful approach to improve engagement in some groups.

The work presented here has explored the use of gamification in higher education through a number of lenses including gender, age and ethnicity. While there is a large body of literature associated with online learning there is a paucity of information examining gamification through such lenses.

One issue with this survey was the low response rate. Less than 1% of the students and academics responded and so questions need to be asked about the validity of the data in the context of accurate representation of opinion. My insider status in this study needs to be foregrounded as this can also contribute to bias. There were no obvious differences when the data was analysed by gender. From the literature on gender differences in online learning this is somewhat surprising. The literature suggests that females aim to establish intimacy in a relationship and so are motivated by social factors such as learning communities while males seek to establish status within a hierarchy which is measured by achievement (Rovai and Baker, 2005). Furthermore, in a demographic study of gamification not limited to HE it was shown that females found gamification of greater benefit compared to males (Koivisto and Hamari, 2014). This work demonstrated no clear age-associated differences in interest in gamification although the majority of student participants were within a narrow age band, 18-21 years. Koivisto and Hamari, 2014 showed that perceived use of and enjoyment of gamification declines with increasing age and that there may be a ‘novelty effect’ that contributes to an eventual loss of interest. Given these factors, this work could be considered as a pilot that triggers a larger, multi-centre study to analyse these areas in greater detail.

In conclusion, this work shows that both academics and students showed an interest in using gamification but this interest was most pronounced in students and in this group there was variation noted in preferences for gamification based on ethnicity. A majority of students but minority of academics thought that using gamification in teaching and learning would lead to improved academic performance. Gamification based on competitions and communication/cooperation were most favourable and this is noteworthy for the design of gamified learning experiences. If gamification is to be adopted in HE it seems imperative to address the concerns of most academics and to identify situations in which it would be of most use. Gamification may also improve the engagement of some students with their learning and further studies in this area are warranted.
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