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Student Engagement and the Novelty Effect in a Technology-mediated Gamified Course

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Abstract

We investigate the extent to which the use of gamification in blended learning influences student engagement. For the gamified course, Personal and Professional Development, in addition to weekly classroom teaching, students participated in a two-tiered system with online *learning* activities. Gamification elements were developed online and the intervention continued for two years. Data were collected from two cohorts of 334 students. Results suggested that students engaged more in the gamified course and that the second year intervention led to an increased, deeper engagement. Also, in both years, there was evidence of "novelty effect," as students' weekly engagement declined across time. Nevertheless, the pattern of decline did not follow what the literature would suggest. Possible reasons may be the usefulness of learning tasks, clearer expectations, and regular communications. We conclude that gamification is a useful tool for onboarding and engaging students. However, to sustain long-term engagement, course designers need to consider other factors.

Keywords: Gamification, higher education, student engagement, autonomy and flexibility in learning

Using technology to engage students is a popular practice (Alavi & Leidner, 2001) but uninspiring use of technology may lead to student boredom, and lack of motivation causing students to engage less in learning (Means, Toyama, Murphy, Bakia, & Jones, 2009); Revere & Kovach (2011) noted that many online learning environments replicate traditional classroom processes by focusing on knowledge acquisition through a single knowledge authority and are not supportive of student engagement.

We argue that in a technology-mediated learning environment, oftentimes, content itself is not sufficient for learner engagement. Drawing on successful practices of companies using gamification in marketing and customer engagement (Zichermann & Cunningham, 2011), we believe that a technology-mediated gamified learning system where multiple game mechanics are used may generate positive, intrinsically motivating experiences (Huotari & Hamari, 2012; Ryan & Deci, 2000). Educational gamification, i.e., the application of game mechanics and elements in an educational context, often with the support of a virtual learning environment (VLE), can be the means of offering a user-cantered, autonomous, and flexible learning environment, which can encourage users to pursue their own goals (Landers & Callan, 2011) and engage in deeper-level activities persistently (Anderson, Huttenlocher, Kleinberg, & Leskovec, 2014).

However, gamification is not without limitations: a notable phenomenon in most gamified systems is the "novelty effect," conceptually proposed by Hamari, Koivisto, & Sarsa (2014) and empirically evident in other studies (de-Marcos, Garcia-Lopez, & Garcia-Cabot, 2016; Hamari & Koivisto, 2015; Hanus & Fox, 2015). The novelty phenomenon of gamification purports that gamification can change user behaviour because users are curious about gamification. However, when the novelty wears off, the observed engagement behaviour may drop.

With two research purposes, examining the effectiveness of using gamification in student engagement and evaluating the novelty effect once gamification rolls out, we designed and implemented a technology-mediated, gamified course at a post-1992 university in UK for a module titled Personal and Professional Development 2 (PPD2). Topics covered included values and transferable skills, critical thinking, and research skills. The gamified online learning system was introduced in 2015-16, as part of blended learning, aimed to address low student engagement and limited contact hours in previous years. It was continued in 2016-17 with improvements on clearer expectations and regular communication. In both years, students participated online learning in a two-tiered system with *Essential Learning* (EL) (14 ELs in 2015-16 and 16 ELs in 2016-17) and *Super Learning* (SL) activities (37 SLs in 2015-16 and 56 SLs in 2016-17) on the institution's VLE (i.e., Moodle) for twenty four weeks in two terms.

EL and SL activities, aligned with the course's learning objectives, were presented as challenges within a competitive framework. EL was designed to achieve a *flipped classroom* and part of the formative assessment regime. SL (with three levels of difficulty) was optional as it was designed to challenge high ability learners and allow flexibility and autonomy in learning. A range of game dynamics (e.g., feedback, freedom of choice, recognition of achievement) and mechanics (e.g., badge, leaderboard, experiential points) were used.

Quantitative data about student engagement (operationalised as number of activity completion) and qualitative data about student reactions to online learning were collected anonymously. Additional engagement data were obtained from the 2015-16 cohort to see how gamification influences student engagement. We used another proxy of student online behavioural engagement, i.e. student views of a learning activity. Data were obtained from three courses on Moodle, including the gamified PPD2 course in 2015-16, the non-gamified

PPD2 course in 2014-15, and another non-gamified course (pseudo name "CMC") in 2015-16.

Table 1 showed that students engaged more in the gamified course with more views per activity. Figure 1 and 2 showed that overall engagement with the course improved in the second year. Also, there was support for the novelty effect, as engagement started high at the beginning of each term (week 2 and 14) and then decreased gradually. However, we questioned the strength of the novelty effect, as student engagement went up again at the beginning of Term 2 and then there was more engagement towards the end of each term (week 11 and 24) in both years.

Table 1.
Comparison between total view count and view count per person in the gamified course and the non-gamified courses

Course title	Total number of learning activity (a)	Number of students (b)	Total view (c)	Average view per activity (c/a)	View per person (c/a*b)	Course grade average
Gamified PPD2 (15-16)	87	166	25295	290.75	1.75	59.32%
Non-gamified PPD2 (14-15)	37	181	5303	143.32	0.77	55.71%
Non-gamified CMC (15-16)	36	172	7377	204.92	1.19	50.02%

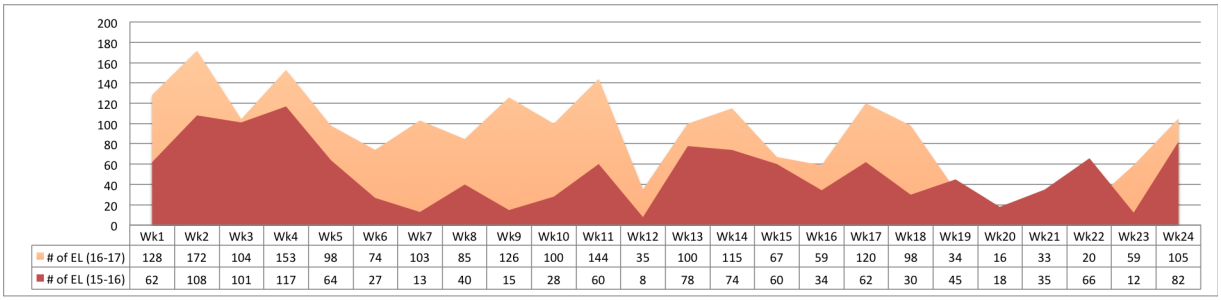
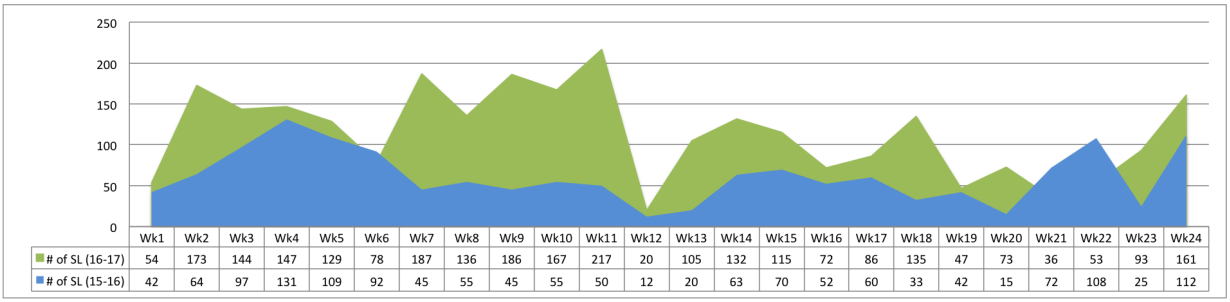


Figure 1. 15-16 vs. 16-17 EL completion by week (X-axis: week; Y-axis: EL completed)



	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8	Wk9	Wk10	Wk11	Wk12	Wk13	Wk14	Wk15	Wk16	Wk17	Wk18	Wk19	Wk20	Wk21	Wk22	Wk23	Wk24
# of SL (16-17)	54	173	144	147	129	78	187	136	186	167	217	20	105	132	115	72	86	135	47	73	36	53	93	161
# of SL (15-16)	42	64	97	131	109	92	45	55	45	55	50	12	20	63	70	52	60	33	42	15	72	108	25	112

Figure 2. 15-16 vs. 16-17 SL completion by week (X-axis: week; Y-axis: SL completed)

To better understand why the second-year gamification led to higher engagement and why novelty effect did not hold as suggested by the literature, apart from the course leader's reflections, we collected qualitative feedback from forty-four students in the second year around the end of the second term. Two questions were asked: "Why do you keep doing ELs?" and "Why do you keep doing SLs?" Data analyses suggested possible explanations and key results were summarised in Figure 3 and 4. First, students saw ELs and SLs as resources that help them improve on assessments and their learning as they gained a sense of control through self-paced learning. Also, clear expectations were made on the course guide, students therefore saw the importance of EL to classroom engagement and their grades. Second, online communication between the course leader and students increased from a total of six in the first year to one message per week in the second year, leading to a reinforcement of the activity. Finally, some students were motivated by the fun and competition elements.

In conclusion, the playful narrative with game mechanics and dynamics indeed took students on board and engaged them, nevertheless, factors such as the usefulness of learning tasks, clearer expectations, and regular communication played additional important roles in sustaining student attentions and efforts.

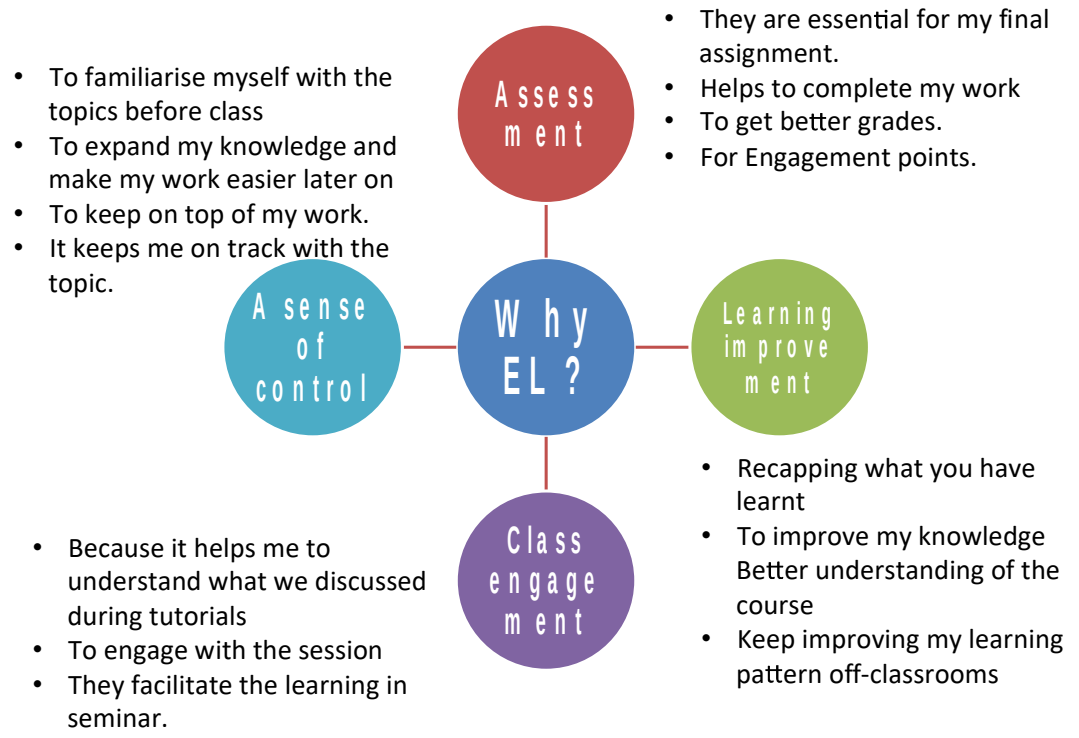


Figure 3. Reasons of EL engagement

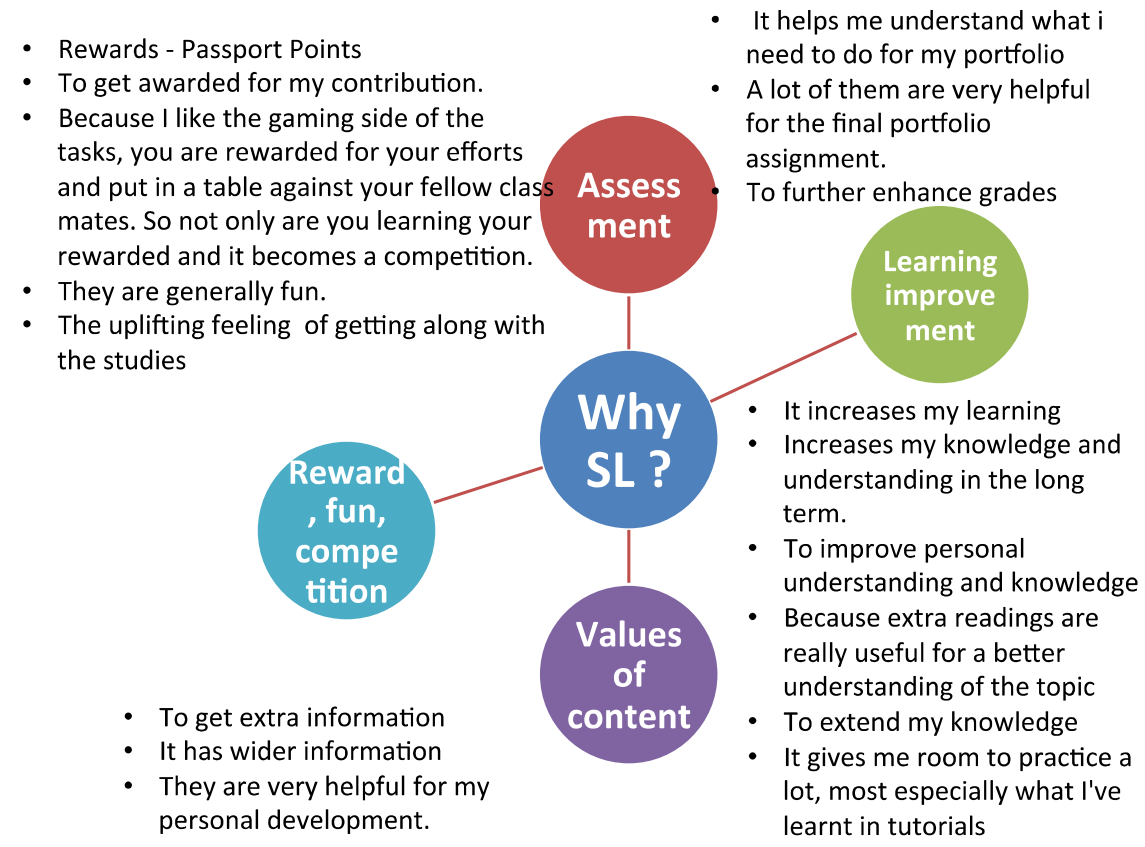


Figure 4. Reasons of SL engagement

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