How Does Technology Innovation Influences Education: A Case of Applying Gamification to Teaching in Business School

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Abstract. This study is to analyze the use of gamification technologies in teaching economics and business courses in an effort to better understand how gamification can be applied to education. Gamification is an innovative and enjoyable way to inspire students and enhance their learning. As a result of its potential to engage and motivate students in their learning process, gamification is drawing more and more attention as a teaching style. Though there is growing interest in gamification's application to education, little is known about how technology tools like gamification affect student learning. A quantitative approach with the questionnaire survey involving 310 participants in total were taken, and SmartPLS 3.0 was used to evaluate the results. Two key findings of the study emerged from this analysis. Firstly, studies show that using games in higher education has a positive effect on students' behavior change. Secondly, perceived playfulness was established as a multi-mediator between other variables of conduct.

Keywords: Gamification · Higher Education Institution · Education · Business Courses

1 Introduction

The gamification sector has been rapidly expanding and improving in recent years, as well as discovering new applications for its services. Gamification services are offered in many industries, but they are most prevalent in the entertainment, retail, manufacturing, media, and publishing sectors. This ground-breaking technology has been used in education during the past ten years with the goal of increasing student engagement in classroom activities and improving students' motivation to study. Educational academics are paying more attention to gamification as a way to boost students' personal ambition to study (Hanus & Fox, 2015). Teachers can use gamification in the classroom to increase motivation and get students more involved in studying. It has become a crucial component of 21st-century education (Głowacki et al., 2018). Therefore, there is a great deal of interest in the field of education in researching the opportunities that this technology brings up in the learning process.

The Covid-19 pandemic has had a catastrophic impact on society, economy, and politics as well as on people's health throughout the world (Arnove, 2020). Universities

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were affected by this because several nations closed campuses, forcing instruction to shift nearly immediately to online delivery. Students at all educational levels have been greatly impacted by the sudden changes brought on by the pandemic. To address the academic lag caused by the Covid-19 epidemic, educators must create the best learning environments possible in these circumstances (Daniel, 2020). With this in mind, we used the Microsoft Teams platform to translate the gamification technique from our face-to-face teaching format to a simultaneous online context. In order to encourage student play, involvement, and behavior change in the teaching-learning process during the Covid-19 pandemic, this paper shows how gamification with a reward-based system has played a crucial role.

2 Literature Review and Hypothesis Development

2.1 What is Gamification?

According to Kapp (2012), gamification is the use of game mechanics, aesthetics, and game thinking to engage individuals, encourage action, increase learning, and solve issues. This design method of applying gameful design in many settings for generating game-like experiences to support diverse activities and behaviors (Huotari & Hamari, 2017; Deterding et al., 2011) has remained a hot subject in both business and academia since the early 2010s. According to Gabe Zichermann, as stated by (Giang, 2013), the use of gaming mechanics increases the capacity to acquire new skills by 40%. Game-based strategies boost users' commitment and incentive to engage in activities and processes. The bulk of clients are familiar with game mechanics since they often play different games. Although this conclusion pertains to organizations and their employees, it remains true regardless of education level. Although this conclusion applies to businesses and their workers, it holds true for education.

Students' lack of engagement and enthusiasm to actively participate in the learning process is the primary source of issues in contemporary education. Therefore, instructors attempt to employ novel strategies and ways to urge pupils to engage in training and stimulate their activity. A viable answer would be to reward efforts and accomplishments with prizes, improving incentives for involvement and activity. This conclusion is based on incorporating gaming aspects into the educational process.

Gamification in education involves incorporating game mechanics and components into a learning environment. Modern ICT-based e-learning presents ideal circumstances for gamification deployment since data processing and student progress monitoring are automated, and software tools can produce detailed results.

There are linkages between games and training; thus, it is logical to include game components into education. In the face of impediments, the activities of a game player are focused toward reaching a preset objective (win). Education has a learning purpose that must be accomplished via particular learning activities or engagement with educational information. In games, it is essential to track the growth of the players since their performance affects their subsequent actions and movements. It is crucial in education to monitor students' development in order to attain learning goals. The learning pathways of students are defined by their degrees of knowledge and skills (Glover, 2013).

Collaboration is necessary for the successful implementation of active learning in education. Unlike training, games have a considerable element of competition. Rather than rivalry, the learning process should emphasize the development of skills for cooperation, teamwork, and accountability for the group's success. There is an indirect link between gamification and knowledge and abilities. Gamification alters the behavior, commitment, and motivation of students, which may help to the growth of their knowledge and abilities (W. Hsin-Yuan Huang, D. Soman, 2013).

Prior research revealed that Gamification has attracted considerable interest, particularly in educational situations (Koivisto & Hamari, 2017; Seaborn & Fels, 2015). Gamifying education and learning has had a long history (see, for example, Deterding, 2011) and an immediately obvious basis, since game design and theories on learning draw significantly on the same psychological theoretical foundations (Landers, 2014). Moreover, the trend of gamification of education and learning has been on the rise due to technology improvements that allow for more digitized learning environments and the usage of video game-related technical capabilities to create immersive and engaging learning experiences.

2.2 Theoretical Background

According to the Stimulus-Organism-Response (SOR) theory (see Fig. 1), individuals react to environments in one of two general ways: approach behaviors include all positive actions, such as the desire to explore, stay, affiliate, or work, whereas averting behaviors include the opposite, such as the desire not to positively act (Mehrabian and Russell 1974). The SOR hypothesis emphasizes the aesthetic incitations that may be found in one's environment and are thought to trigger certain emotions (Wohlwill 1976).

The SOR theory may be used in a wide variety of contexts. Bitner (1992) expands the SOR theory beyond its original application to emotional reactions by including cognitive and physiological factors, building on the work of Mehrabian and Russell (1974). An updated SOR framework with cognitive and emotional systems that consider all prior engaged experiences, including long-term memory, was recently presented (Jacoby 2002). Internal (website quality) and external (reputation) sources of information are added to the SOR theory by J. Kim and Lennon (2013) as stimuli that impact purchase intention (response) via customers' (organisms') cognition and emotion. A number of scientists such as Eroglu, Machleit, and Davis (2003), Sautter, Hyman, and Lukosius (2004), Richard (2005), Oh, Fiorito, Cho, & Hofacker (2008), J. H. Kim, M. Kim, and Lennon (2009), Mummalaneni (2005), Manganari, Siomkos, & Vrechopoulos (2009), Bjork (2010) refer to SOR model according to Mehrabian and Russell (1974) when designing online consumer behavior models.

2.3 Hypothesis Development

This study investigated the relationship among constructs such as familiarity, expectancy, intimacy, perceived playfulness and behavior change of students when they join the game in class. Based on the SOR theory, familiarity, expectancy and intimacy is considered stimulus that influence behavior of participating in in-class games in the context of

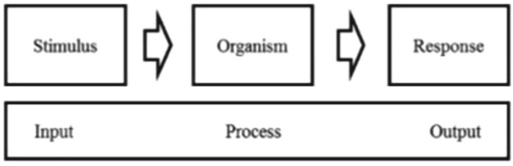

Fig. 1. SOR theory (Mehrabian & Russell, 1974)

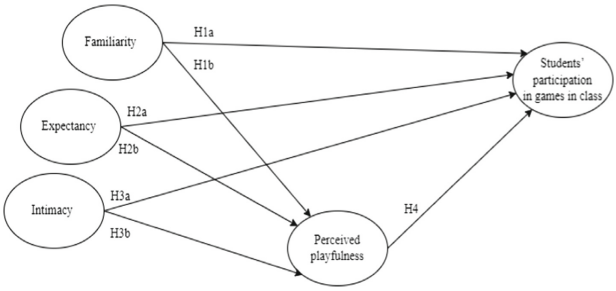

Fig. 2. Research model

non-participating before, through students' (organisms') cognition and emotion which is perceived playfulness in this research.

The Relationship Between Familiarity with Perceived Playfulness and Behavior Change When Students Participate in Games in Class

Researchers and scholars in information systems, marketing, computer science, and other fields have used the familiarity construct to study how people adopt, use, and accept different kinds of information systems. For example, Komiak and Benbasat (2006) use the familiarity construct to study how familiarity affects how people adopt, use, and accept recommendation agents (RA). People get to know recommendation agents "through past and direct interactions" (Komiak & Benbasat, 2006, p. 946). Komiak and Benbasat (2006) say that being familiar makes people more likely to use recommendation agents. Familiarity means "knowing what, who, how, and when something is happening" (Gefen et al., 2003, p. 63). By putting the first talks in the context of playing class games, familiarity is the knowledge and understanding of how to use most of the features and functions of class games based on past exposure and experience. The games we play in class have familiar parts, functions, and software applications (apps) that help people's memory, mental, and cognitive processes. In their research, Proctor and Van Zandt (2011) say that designers should use familiar features and functions to get more people to use, adopt, and like game apps. So, familiarity reduces risk by making people smarter, more aware, and more knowledgeable (Gefen et al., 2003; Komiak & Benbasat, 2006; Luhmann, 1979). The Visual Perception Theories say that how we see things depends on how familiar they are and how our minds and brains work (DeLucia 2007). Consequently, we examined the following hypotheses:

H_{1a}: Familiarity positively impacts behavior change when students participate in games in class.

H_{1b}: Familiarity positively impacts Perceived playfulness of students when they join the game in class.

The Relationship Between Expectancy with Perceived Playfulness and Behavior Change When Students Participate in Games in Class. The unified theory of acceptance and use of technology (UTAUT) of Venkatesh et al. (2003) proposed that expectancy influence behavioral intention, and then technology use. In this study, expectancy is defined as the degree to which using technology games will provide benefits to users in performing certain activities as well as the degree of ease associated with users' utilization of technology games. In addition, according to the SOR theory, expectancy is considered a stimulus affecting students' cognition and emotion which is perceived as playfulness in this research. Therefore, the hypotheses are suggested as follows:

H_{2a}: Expectancy positively impacts behavior change when students participate in games in class.

H_{2b}: Expectancy positively impacts Perceived playfulness of students when they join the game in class.

The Relationship Between Intimacy with Perceived Playfulness and Behavior Change When Students Participate in Games in Class. Intimacy involves feelings of closeness, emotional connectedness, and the ability to tolerate a partner's flaws (Tolstedt and Stokes 1983). It's important for interaction and adaptation (Lowenthal and Haven 1968). We were interested in how intimacy affects continued intention and how it affects human interactions (Schaefer and Olson 1981). It's important for building and maintaining relationships.

Studies suggest intimacy improves relationships. Grayson and Ambler (1999) found that perceived intimacy with a marketing business affected long-term service consumption. Jap and Ganesan (2000) say intimacy benefits marketing channel connections. Verhoef et al. (2002) studied the effect of commitment-based intimacy on referrals and sales. Bickmore and Picard (2005) studied human–computer relations in IS. Intimacy might help maintain relationships, they said. Rau et al. (2008) studied how proximity in online social network services (SNS) influences posting frequency and how lurkers and postings vary by intimacy. Intimacy increases posting frequency, and social-emotional factors impact SNS posting activity, according to their research. Based on these reasons, we propose the following hypothesis:

H_{3a}: Intimacy positively impacts behavior change when students participate in games in class.

H_{3b}: Intimacy positively impacts the Perceived playfulness of students when they join the game in class.

The Relationship Between Perceived Playfulness with Behavior Change When Students Participate in Games in Class. Playfulness is an intrinsic virtue shaped by an individual's surroundings (Grove et al., 2012). Moon and Kim (2001) defined perceived playfulness as users' attention, interest, enjoyment, and interaction with mobile devices. In this research, a learner's playfulness is described as "cognitive spontaneity and feeling of enjoyment in doing a task" (Spence & Usher, 2007, p. 269) and is considered one of the key motivating elements that might affect learning engagement using mobile

learning games as teaching aids (Tan & McWilliam, 2008). When a student plays, s/he is engaged for joy and delight rather than extrinsic rewards (Moon & Kim, 2001). Playfulness is linked to IT adoption and usage (Kang, Wang, & Lin, 2009). Trevino and Webster (1992) found that fun led to positive confirmation and contentment. Recent e-learning study shows that perceived fun increases behavioral intention to accept computer-based assessments (Terzis & Economides, 2011). Thus, the hypothesis is proposed as follows:

H_4: Perceived playfulness positively impacts behavior change when students participate in games in class.

3 Methodology

The research follows a quantitative approach, including a web-based survey designed explicitly for Students in the college of Business. Participants were chosen based on a survey of existing courses that apply the gamification method to teaching. The online survey was conducted with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) to measure respondents' answers. Demographic questions were included in the survey by sample profiling of the respondents.

The survey consists of three parts. In the first part, participants were asked if they had the chance to play any game during their learning which was provided by the lecturers for learning purposes. This information allowed the study to recruit the relevant respondents for the study. The second part of the survey was used to identify the demographic characteristics of respondents, including age, gender, experience using game, and study-year, and major. The third part concerned participants' behavior when playing a game. This part covers five main variables: Perceived expectancy (Oliver, 1997), Perceived playfulness (Hsu & Chiu, 2004; Lin et al, 2005), Familiarity (Gefen, 2003), Intimacy (Tomasi, 2007) and Behavior (Venkatesh et al, 2003). Validated multi-item scales were adopted from related literature. These items were translated into Vietnamese by the research team. A pilot test of this survey was conducted with ten people from universities and colleges for feedback about wording and layout. Then, the adjusted scale was used as a measurement scale in the actual survey.

In this study, the non-probability convenience sampling method is applied, which means that the sample is collected from a group of people who are easy to approach (Saunders, M; Lewis, P; Thornhill, A, 2012). Most researchers prefer this method because of its numerous advantages, including being extremely fast, time-efficient, and cost-effective (Henry, Gary T, 1990). The sample size is determined using empirical formulas for each processing method, including sample size calculation for factor analysis (Hair et al., 2010) and regression analysis (Green, 1991, Tabachnick & Fidell, 2007). The volume of the research sample has to follow a formula: $n >= 8\ m + 50 = 258$ observations (where n is the sample size, m is the number of independent variables of the model, $m = 14$). To analyze confirmatory factors (CFA), the collected data need to be at least five observed variables on a single observed variable (Hair et al., 2010). Therefore, to gain more data reliability and eliminate invalid responses, bigger sample size was collected. In conclusion, the minimum sample size for this research will be 319 after reviewing and removing inappropriate samples from the 310 samples.

From the descriptive analysis results presented in Table 1, there are 310 respondents. The female population is higher than the males, consistent with the business student population in Vietnam. Regarding the study year, 12.3% of respondents are first-year, and the majority are second-year students (57.4%).

Finally, the collected data was coded into SPSS 25 software for descriptive statistical analyses to test the reliability and validity. To test the hypotheses with structural equation modeling (SEM), SmartPLS 3.0 was applied.

4 Results and Discussion

4.1 Results

This study employs two stages to evaluate data from the questionnaire, following Anderson and Gerbing (1991) approach. Cronbach's Alpha was used to assess the scales' reliability. When Cronbach's Alpha is higher than 0.6, the factor is reliable (Hair et al., 2010). According to Table 1, the reliability of all variables in this study has a Cronbach's Alpha greater than 0.6, indicating that the items in the scales are internally consistent. Furthermore, most variables have an AVE greater than 0.5, meaning that the measurements of all constructs have a high level of convergent validity (Fornell and Larcker, 1981). The C.R also shows that both constructions have a high level of internal consistency reliability, as shown in Table 1.

The study hypotheses were tested using bootstrapping techniques. Another non-parametric technique for assessing the accuracy of the PLS estimate is the bootstrap. According to Hair et al. (2010), the bootstrap samples should be 5000 times.

As shown in Table 2, "Behavior change" is directly influenced by Intimacy, and Perceived playfulness. In this case, playfulness are multi-mediators that mediate the relationship between Familiarity, Expectancy, and Behavior change.

Based on the Fig. 2, The business student's intimacy and perceived playfulness of gamification significantly directly impacts behavior change intention (H3a, $t = 4.475$, $b = 0.132$, $p = 0.000$ & H4, $t = 3.872$, $b = 0.338$ $p = 0.000$). This finding reinforces the results of previous research. It emphasizes the importance of Intimacy and Perceived playfulness as a major factor influencing business students' playing games as a teaching-learning technique.

Table 1. Reliability and Validity Analysis.

	Cronbach's alpha	C.R (rho_a)	C.R (rho_c)	AVE
BEHAVIOR CHANGE	0.874	0.878	0.903	0.572
EXPECTANCY	0.742	0.773	0.835	0.560
FAMILIARITY	0.827	0.839	0.873	0.533
INTIMACY	0.831	0.846	0.888	0.668
PERCEIVED PLAYFULNESS	0.829	0.841	0.880	0.597

Other direct relations to Behavior change Intention hypotheses need to be rejected due to $p > 0.05$, including Familiarity (H_{1a}, $t = 0.251$, $b = 0.006$, $p = 0.802$) and Expectancy (H_{2a}, $t = 1.165$, $b = 0.025$, $p = 0.244$). The familiarity about technological issues is probably not a barrier for business students to join the game anymore, which suggests an indirect effect of Expectancy factors on the intention of Business student gamification behavior change intention.

The most important relationship in this study was the influence of Perceived playfulness on the relationship between other factors to the behavior change. The results reported in Table 3 show that the indirect effects between expectancy, intimacy and behavior change are strongly, or the perceived playfulness fully mediate the relationship between expectancy, intimacy and behavior change (1, $b = 0.262$, $p = 0.000$ & 2, $b = 0.293$, $p = 0.000$; 3).

Table 2. Hypotheses testing results.

	Original sample	Sample mean	Standard deviation	T statistic	P value
H1A	0.006	0.006	0.023	0.251	0.802
H1B	0.082	0.089	0.076	1.082	0.279
H2A	0.025	0.026	0.022	1.165	0.244
H2B	0.302	0.302	0.060	5.079	0.000
H3A	0.132	0.130	0.030	4.475	0.000
H3B	0.338	0.337	0.087	3.872	0.000
H4	0.867	0.868	0.020	43.198	0.000

Note: * $p < .10$; ** $p < .05$; *** $p < .01$

Table 3. Indirect relationship testing results.

	Original sample (O)	Standard deviation (STDEV)	T statistics	P values
EXPECTANCY → Perceived playfulness → BEHAVIOR CHANGE	0.262	0.052	5.077	0.000
Intimacy → Perceived playfulness → BEHAVIOR CHANGE	0.293	0.078	3.772	0.000
Familirity → Perceived playfulness → BEHAVIOR CHANGE	0.071	0.066	1.078	0.281

4.2 Discussions

Understanding antecedents and the cognitive factor is extremely helpful because increasing higher education institutions are encouraging their students to partipate in games in class for self-advancement, performance, effectiveness, productivity, and stuyding quality. Thus, we develop our research model. All variables together account for 65% of the variance in the dependent construct. This information shows that the amount variance explained by the study's variables is fairly considerable (Chin, 1998), and is thus valuable to knowledge. Our model supports to explain expectancy has fully indirect positive impact on behavior of participating in in-class games; intimacy has direct and indirect positive influence on the students' decisions relating to joining games in class; and or the perceived playfulness mediate the relationship between expectancy, intimacy and behavior change intention.

This work contributes much to knowledge. It analyzes the effect of expectation, intimacy, familiarity, and perceived playfulness on students' engagement in class games and fills a vacuum in the research by establishing and using the SOR model. This study's drawbacks include using a sample from one institution in Vietnam instead of many universities on other continents to investigate whether cultural variations affect the results.

The results suggest that instructors should develop tools and resources that convey learning material information to boost student engagement and gaming choices. The research also demonstrates that educational institutions at the higher level have the potential to engage in activities including gamification.

Future research should explore how added-value mobile game applications can enhance loyalty and a university's relationship with students, and how mobile technologies can improve an education institution's learner relationships, lecturer engagement, operational efficiency, enrolment effectiveness, and other key functions. Future studies might study how university architecture has to alter to meet policy opportunities, cultural hurdles, and how to overcome them. Based on theories of group dynamics, coordination, communications, and decision-making in dispersed systems, researchers may establish competitive advantage and/or sustained competitive advantage. What operational adjustments should universities undertake, and what are the opportunities/pitfalls?

5 Conclusion

This research has added to the current body of knowledge by examining the impact of expectancy, intimacy, familiarity and perceived playfulness on students' participation in game in class. It fills a vacuum in the literature by establishing and using the Stimulus-Organism-Response (SOR) theory-based theoretical model. Our results corroborate the SOR theory and imply that that both expectancy with a education-aimed games and intimacy have a positive and significant direct and indirect effect on behavior change of students when they join in games in class through perceived playfulness. The inferences that might be drawn from it are that universities should design devices and games integrated with these with features and pricing plans and allows these universities to stay competitive, differentiate themselves and provide a great learner experience. The real-world implications of this study are that we are living through a historic shift that

makes technology more important -- in fact, indispensable -- to building close relationship between universities and their students. The primary lesson that may be applied to theory and practice today is that university administrators should embrace the moment by relentlessly concentrating the strategy and objectives of their institutions on the students who purchase their programs.

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