

Gamification Effect on Higher Education Students' Motivation

Talal Alasmari

University of Jeddah, Jeddah, Saudi Arabia

<https://orcid.org/0000-0002-3330-1980>

Talal Alasmari, Ph.D., Assistant Professor, Instructional Technology Department, College of Education, University of Jeddah, Saudi Arabia.

*Correspondence concerning this article should be addressed to Talal Alasmari, Instructional Technology Department, College of Education, University of Jeddah, Jeddah, Saudi Arabia, P.O. box 15758, Jeddah 21454. E-mail: talasmari@uj.edu.sa

ABSTRACT:

Gamification has nowadays been increasingly gaining acceptability in teaching and learning context. Gamification is a powerful educational tool because it encourages and enhances the motivation of the learners, especially the learners of the digital age. It greatly facilitates the learning with engagement, motivation and collaboration among students. The study is conducted to find out the significant effect of gamification motivation among university students. The study used a correlational descriptive design. The population of the study is all preparatory year college students who are studying the course of 'SPEPS-100: University Study Skills' at the University of Jeddah, Saudi Arabia. The sample selected for the study is comprised of 334 students who have been selected using random sampling technique. Students were given gamified online classes using LMS with two gamified strategies i.e. badges and leaderboards with a maximum score 30. Motivated Strategies for Learning Questionnaire (MSLQ) is used to assess students' motivation for learning. The three dimensions taken from MSLQ, which are value components, expectancy components, and affective component, are taken for assessment with 31 items. The statistical tests used for analysis of data are individuals' correlation and simple linear regression analysis. The study found a significant effect of gamification on motivation as overall and for its every dimension among university students. The study concluded that although there is a significant effect, gamification is not a strong predictor of motivation among college students.

Keywords:

game; game elements; gamification; motivation; motivated learning strategies

Article Received: 18 October 2020, Revised: 3 November 2020, Accepted: 24 December 2020

Introduction

People have been engaging and entertaining with numerous games since the origin of humankind because gaming is deeply rooted in the human psychology (Bunchball, 2010). Games are inextricable from the human culture as it is related with some health and other advantages (Zichermann & Cunningham, 2011). Reward system is a central element in gaming that instigates the players to achieve some goals or accomplishing targets (Glover, 2013). Games and learning are greatly interrelated because playing a game necessitates that a player has to know the rules and learning through games and thus the focus is not only on the game mechanics but also on strengthening the awareness of the psychodynamics of the other players, context of

game, and the contents that are incorporated in to the stream (Pian, 2017).

Motivational factors are paramount in gaming that may account for promoting the learner's academic engagement and sustaining the interest in learning as a process. Gaming can be applied as a powerful tool in various instructional practices such as individual learning, group learning, collaborative learning, ...etc., that is an effective incentive system which creates a game layer on contemporary educational practices; this is a revolutionary concept (Annansingh, 2017). Kolb's (1984) experiential learning theory is highly pertinent to explain the potential of gaming in teaching and learning process that focuses on deepening knowledge or understanding through doing or experiences. The spirited tasks and joyfulness in games greatly help motivate the

students to be engaged with academic activities that may enhance their retention power and ability to easily remember what the students learnt (Kiryakova, Angelova, & Yordanova, 2014).

Teachers can address the issues of motivating the students and sustaining the interest in learning by adequately implementing advanced digital technologies with proper rewards and incentives in instructional practices as the dynamics of gaming rightly offer this advantageousness (Annansingh, 2017). Creating a gameful environment is a crucial challenge which is comprised of conceiving and framing of the rules to immerse players in having fun and other entertaining activities. Game design can balance the incorporation of game elements and needed rules that may provoke heightened emotional responses in players (Salen & Zimmerman, 2004; Schell 2008; Hunicke, Leblanc & Zubek, 2004).

Gamification

The term gamification has been popular in recent decades (McGonigal, 2011). The coinage of the term gamification is thought to be credited with Nick Pelling (Deterding, Dixon, Khaled, & Nacke, 2011). There was a higher-level expectation since gamification was first implemented in academic activities (Pian, 2017). It is responsible for enhancing students learning engagement and sustains joyful environment in teaching and learning process (Reeves & Read, 2009). Effective gamification techniques are created with adequately adopting game dynamics in to teaching and learning activities by implementing proper rewards and incentive systems in instructional practices (Werbach & Hunter, 2012).

The four human innate human tendencies focused by self-determination theory are psychological growth, unified self, wellbeing, and autonomous and responsible behaviours that are mainly related with dynamics of gamified teaching and learning practices since these innate tendencies are generally fulfilled when there are

competence, relatedness and adequate autonomy. Competence instigates emotional dimension of an individual's social and environmental involvement while relatedness is responsible for connection and interaction with others; autonomy is paramount in forming the behaviour of an individual (Chapman & Rich, 2018). Games can be used as a powerful tool for teaching and learning activities (Kapp, 2012). Students of digital generation mostly expect something that would be responsible for edutainment like gamification as they are interested with modern technology that may foster their expectations to be engaged beyond conventional teaching approaches (Lister 2015).

Game and game-based learning are nowadays being interchangeably used though there are drastic differences in the two concepts; game-based learning mainly focuses on using games as teaching and learning strategies, while gamification focuses on incorporating game elements and dynamics to instructional practices (Wood & Reinert, 2012; De-Marcos et al. 2014). Gamification is unique area which is different from serious games especially that it is not just reversing the plans to solid games; however, gamified teaching and learning practices are operational in relation to principles of games in non-gaming environment (Deterding et al. 2011). Gamification as a teaching and learning strategy can enhance the motivation level of learners, sustain interest in learning, create a positive attitude towards learning and improve overall academic performances (Chapman & Rich 2018). Integration of game elements and mechanics to pedagogic activities can facilitate high level involved and engage learning of students. Thus, gamification can be seen as not merely a tool that uses a game for instructional purposes only; however, it applies the basic principles of games and integrates game dynamics and game elements to pedagogic practices (Sriratnasari, Wang & Kaburuan 2019).

Definition

Gamification has been defined by Bunchball, (2010), Deterding, 2011), Deterding, Dixon, Khaled, & Nacke, (2011), Deterding, Sicart, Nacke, O'Hara, & Dixon, (2011), Lee & Hammer (2011), Sheldon (2012), Werbach & Hunter, (2012), Huotari & Hamari, (2012), Kapp, (2012), Hamari, Koivisto, & Sarsa, (2014), Kim, Song, Lockee, & Burton (2018), etc. from various perspectives. Gamification is defined as utilization of the game design features in non-game environments (Deterding, 2011; Deterding, Dixon, Khaled, & Nacke, 2011). It is the application of the game mechanics to non-game activities to change people's behaviour (Bunchball, 2010). It is the incorporation of user-centred game design elements into non-game contexts (Nicholson, 2012). It is the cover to add the interactivity, engagement, and immersion that leads to good learning (Kapp, 2015). According to Salen & Zimmerman (2003), gamification is "a system in which players engage in artificial conflict, defined by rules that result in a quantifiable outcome" (p. 80).

Gamification offers more than a game-based learning that can address major psychological issues related to instructional practices; that is, by enhancing attention and retention among students and in making the learning process more challenging and engaging. It is highly helpful to reinforce knowledge acquisition, problem solving, learning by discovery, collaborative learning, and generally stimulating high level of motivation, that is highly advantageous for pedagogic practices (De-Marcos et al. 2014).

Gamification mainly uses game elements such as interface, game mechanics, and clear goals to be achieved by users (Cheong, Filippou & Cheong, 2014). Game designs are comprised of specific goals, incentive system, rules, feedback, and voluntary participation (Farber, 2015). Problem solving abilities are mostly fostered by gamification strategies because it facilitates

students' self-paced learning system in a way that help create a unique individual's convenient learning environment. The role of learners in gamified teaching and learning activities is active and it makes learning more fun-based and minimise external control on learners (Martens et al. 2004). The application of elements of game design to teaching and learning practices can offer differentiated instruction and instigates the potential for rewards or incentives and challenges for instructional practices as well (Wiggins, 2016). Gamification can act as a motivator, providing thus a powerful tool to attract students to get engaged in academic activities (Tan & Hew, 2016). Moreover, it can enhance students' motivation so as to help them participate mainly in four levels: gamification as a partner of instructional process, promotion for interactive learning, contributor for cognitive, performative and normative engagements, and a solid support system to the institution (Kusuma, Wigati, Utomo, & Suryapranata 2016).

Effectiveness of Gamification in Education

Several studies have been conducted to evaluate the effectiveness of gamification in relation to academic activities in a broad variety of disciplines. The studies of Gåsland (2011), Cronk (2012), Drace (2013), Goehle, (2013), Abrams & Walsh (2014), Lambert & Ennis (2014), Lin (2014), Denny, McDonald, Empson, Kelly, & Petersen, (2018), Tsay, Kofinas, & Luo, (2018) reported positive effect of gamification on academic activities and some studies recommended some way forward to improve the effectiveness of gamification. The main reason for increasing acceptability for gamified teaching strategies and its centre of attraction in recent times in educational scenario is that the old and conventional methods of teaching seem to be highly ineffective for the students from younger generation. Gamification is pivotal in addressing educational needs of the learners from new generation, in other words, the 'digital natives' or

'Z' generation which poses some crucial challenge to educators to integrate new and innovative teaching and learning methods and instructional approaches. The integration of gamification has been proved potential in the scenario of education as it is responsible to create learning environment with technology mediated communication that may offer direct exposure of instructor's expertise and experience (Flores-Morador, 2013). Gamification can be used to augment with academic activities. It greatly promotes student's engagement and enhances participation among the learners (Raymer, 2011). Gamification is effective in the extant to engage the students in non-curricular activities as well (Fitz-Walter, Tjondronegoro & Wyeth, 2012). It is helpful for promoting behavioural changes to increase student's involvement in teaching and learning process (Decker & Lawley, 2013).

Gamification can be considered as an important instructional technique to enhance retention capacity among students while engaging in an immersive teaching and learning environment. It can improve students' grade levels and increase motivation with effective engagement (Barata, Gama, Jorge, & Gonçalves, 2013). Gamification facilitates more opportunities for students that could help them discover when exactly there might be proper interest and willingness to learn; this is because gamification is an innovative way to attract and engage learners (Kapp, 2012). Therefore, among new e-learning strategies, gamification can be regarded as a significant approach of ensuring students' engagement and involvement (Johnson, Adams, Cummins, Estrada, Freeman, & Ludgate, 2014). It can be considered as effective strategy since it greatly arouses the interest in students by motivating academic activities and instructional practices (Lee & Hammer, 2011). The success of gamification in relation to educational activities greatly banks upon its attractiveness to engage the learners in academic activities taken into consideration that the engagement has been

proved as positively correlated with the outcomes of students' success, and other related factors such as satisfaction, persistence, and achievements (Kuh, 2009).

Components of Gamification

Gamification can be incorporated to academic activities using various techniques such as points, scores, leaderboards, and badges as rewards for attaining various levels of learning activities (Poondej & Lerdpornkulrat, 2016). Rewards are pivotal in gamification that may be in the form of badges, points, and scores that serve as extrinsic motivators of learners in gamified environment (Goehle, 2013). It necessitates the game designers to make games more productive, motivating, and encouraging and therefore sustaining the interest in students to achieve specified goals (O'Donovan, Gain, Marais, 2013; de-Marcos, Domínguez, Saenz-de-Navarrete, & Pagés, 2014). Gamification is operational in terms of game mechanics, aesthetics, and game thinking in non-game contests. Game mechanics is mainly related to the functioning components that are a series of tools; these tools are expected to be used accurately to yield meaningful response (Zichermann & Cunningham, 2011).

Game mechanics involve the elements such as points, badges, and leaderboards that are mostly technical features of the game arena. Game dynamics mainly related with these components in relation to shape the interaction with the user experience. Hence dynamics stresses on how players interact with the game platforms in relation to the mechanics. It mostly banks upon the emotions that users experienced as a result of having a sense of gaming competitions or arousal of curiosity. Game aesthetics consisted of elements such as challenges, achievement, earnings, discovery, productivity, sensation, and fun etc. (Annansingh, 2017). Kusuma, Wigati, Utomo, & Suryapranata (2016) point out major components of gamifications as peripheral or surface elements, deep dynamics, and gaming

experience; these constituents are pivotal in conceptualising the gamified programmes.



Fig. 1 Gamification elements (Kusuma et.al 2016)

Werbach & Hunter (2012) consider three major things as basic constituents of gamification: dynamics, mechanics, and elements. Dynamics are important elements that may mostly appear implicitly in the gamification environment. Hence Werbach & Hunter (2012) consider the most pivotal dynamics of gamification are emotions that may account for competitiveness curiosity, satisfaction, happiness, and frustration. Constraints are also significant dynamics as it is the result of some limitations or forced trade-offs. Narrative can also be considered as dynamics of gamification. This relationship - as the one of dynamics of gamification - mainly accounts for social interactions creating feelings of relatedness, benevolence, and progression, as well in relation to player's gradual development.

Mechanics are paramount in prompting player's learning engagement. Werbach & Hunter (2012) mentions that the most significant mechanics are challenges, chances, and cooperation. In this context, learners are expected to work together to achieve some shared goals, competitions, resource attainment, incentive system such as reward for some action or award for achievement, transactions, winning conditions, and feedback. Components can be referred to as more important states of mechanics and dynamics. Werbach & Hunter (2012) point out that important components are achievements specified by

learning objectives, badges, avatars as visual representations of a player's identity, collections, unlock challenges for further exploration, combat leaderboards gifting, points as numerical representations of game progression, levels, quests for pre specified challenges with objectives and representative rewards.

Gamification mostly stimulates extrinsic motivation in learners which is not the case for other e-learning tools and techniques. It is responsible for instant feedback, spirited competition, and attractive rewards at every phase of the activities. It is highly operational in understanding the motivation and needed design practices. Learners may not be motivated at the beginning phase of the learning but numerous rewards and incentives are offered later to enhance their motivation and attitude towards learning with the challenges of current instructional practices. These practices involve tasks of maximising students' engagement, sustaining their interests, retaining attention, and maintaining a positive attitude in a nurturing environment (Ryan & Deci, 2000; Deterding, 2012; Wood & Reiniers, 2012).

The teaching and learning engagement can be typically explained with regards to three major components, such as behavioural engagement, affective engagement, and cognitive engagement. Behavioural engagement may be responsible for

enhancing participation and can be measured as a positive conduct, persistence, lack of disruptive behaviour, participation in school activities, and involvement in learning and academic tasks attention and retention. Affective engagement focuses on the willingness to do the work and consists of interest in learning activities, enjoyment, and positive attitudes towards learning. Cognitive engagement refers to students' concentration in learning to achieve deep understanding of the discipline and expertise. This shows a strong desire to go beyond the ordinary levels and overcome the provoking challenges. Deep strategies or approaches to teaching and learning process can highly correlate with higher levels of learning outcomes (Appleton, 2008; Finn, Pannozzo, & Voelkl, 1995; Kong, Wong, & Lam, 2003).

Four Freedoms of Play

The gamification has the advantages of the dynamics of 'four freedoms of play' as discussed by Osterweil (2007). He focuses on the fact that "freedom" is paramount in gaming experiences. If there is no sufficient freedom in the flow of play, the gaming experience will not be teaming with fun and joyfulness. The four freedoms as discussed by Osterweil (2007) are the freedom to fail, to experiment, to assume different identities and a freedom for effort.

Freedom to fail is pivotal when considering failure as it provides opportunities for further learning and improvement of performance. The human tendency to avoid failure may enhance students' immersion into the learning; the players are keen to prevent mistakes. The sense of freedom to fail mostly enhances the freedom to experiment with new circumstances that may lead to new learning experiences. Experimentation really opens the opportunities for enhancing self-directed learning that may increases students' academic engagement.

Identity is substantial constituent in instructional designs; it greatly banks upon the

role given to the students in their learning experiences. The immersion to games sets the stage to redefine identity of players that encourage the learners to think through several perspectives by assuming new and interesting identities. The freedom of effort is generally connected with some specified limits or boundaries that may depend upon how much effort is being exerted to invest in certain tasks. The internal rhythm in games is responsible for shaping and redefining students' goals and effort as per the needs of changing circumstances that may greatly help refresh the attention spans of learners.

Gamification unequivocally instigates higher level of students' intrinsic and extrinsic motivation. Incorporation of game mechanics and game elements to teaching and learning practices can ensure students' engagement in academic activities and it will be highly relevant to sustain the learners' interests. Gamification is an innovative strategy for both pedagogic and andragogic practices especially it is highly suitable to address the pedagogic needs of the learners of digital generation. Hence, studying the impact of gamification on students' motivation is highly relevant since it should seek the effect of gamified strategies on various aspects of motivation such as intrinsic goal orientation in learning, extrinsic goal orientation in learning, monitoring learning beliefs, self-efficacy for learning and performance, learner autonomy, and the level of engagement; this can greatly influence the academic development of students.

Literature Review

Smiderle, Rigo, Marques, Coelho & Jaques (2020) found participants who used the gamified learning techniques with a higher level of points, badges and access as compared to the participants who didn't use the gamified learning environment, though no statistically significant results were reported for engaged learning. The study also found that gamification had a distinct

effect on consumers based on their personality attribute.

Zainuddin, Shujahat, Haruna, & Wah Chu (2020) found that the applications of innovative gamified strategies are effective in evaluating students' learning performance. It also found that gamification increased students' academic engagement through the inclusion of game-like features such as badges, points, awards, and leader board in non-game environments.

Ofosu-Ampong, Boateng, Anning-Dorson, & Kolog (2019) found high level of access to learning technology devices available for the students. They also found a direct effect of performance expectancy, effort expectancy, attitude behavioural intention, image behavioural intention, and trust behavioural intention on behavioural intention that shows a strong indication of technology acceptance among students.

Imran (2019) found that time spend for learning in subjects and awards earned was more in gamified than in non-gamified environments. In non-gamified learning environments, students have less motivation compared to entertainment imposed by gamification. It shows that the learners spend more time for studying and earning more points and badges that really increased their academic performance.

Ding, Erkan, & Orey (2018) found that there are high levels of student engagement in terms of cognitive, behavioural and emotional engagement. It is also shown that there is a positive effect of gamification on students' engagement and this provided a better understanding of the specific effects of game-related features on teaching and learning process.

López, Rincón-Flores, Juanjo Mena Francisco, José García-Peñalvo María, & Soledad Ramírez-Montoya (2019) found that gamification in the teaching and learning process leads to improved academic engagement of learners.

In the same context of this study, Bouchrika, Harrati, Wanick & Wills (2019) found that gamification is a potential tool to motivate the learners to the uptake of educational systems; it enhances students' interactivity and academic engagement as well. Students revealed that autonomy and recognition were significant dimensions of their learning experience in gamified environment.

Seaborn, Fels, Bajko, & Hodson, (2019) found that the gamification was moderately effective for students in overall learning. It is also found that engagement is the positive outcome of applying a gamification in teaching and learning process. Moreover, Huang, Hew & Lo (2019) found that gamification has a positive effect on engagement of students in completing academic activities, and enhancing students' academic outcomes. It is noticed that the gamified flipped learning group performed significantly better than the flipped learning group.

Palomino, Armando, Wilk, Alexandra, & Seiji, (2019) found that using narratives as an element of gamification in education highlights features such as the existence of the actor as the learner, the element of choice, interactivity, sequence of events, space, date, time of interaction.

Kyewski, & Kramer (2018) found that the badges have no significant impact on motivation and academic performance among students. It is also shown that there was a decree in student's intrinsic motivation over time as badges were not potential to enhance the students' intrinsic motivation and badges were not helpful in learning through social comparison as well.

Rahman, Sabrina Ahmad, & Hashim (2018) found that students are more interested in using gamification when the technological devices are very convenient and easy to use. It also found that perceived ease is a predictor of students' attitude towards using gamification technology in learning.

Chapman & Rich's (2018) study found no significant correlations between overall motivation for the gamified course and any demographic variable. It shows that student age, gender, hours worked per week, or student status are not predictors of motivation for gamifications. It is also found that a slight negative correlation between overall motivation and comfort level with technology and a positive correlation with time spent in the gamified course platform. Furthermore, Khan, Ahmad & Malik (2017) found that the game-based learning has a significant impact on students' engagement. It also found that gamified learning techniques were not equally effective for all students since academic performance of girls was higher than for boys in relation to engagement and learning outcomes.

Kopcha, Lu, Kalliane, & Ikseon. (2016), found the badges and the reactions of gamification helpful in enhancing social interactions among students. It is also found that students were motivated by the gaming dynamics when it was incorporated into the course. In addition, Buckley & Doyle (2016) found significant increase in general knowledge and awareness of learners by the gamified learning intervention. It also showed that there is a positive correlation between the various types of motivation and participation in learning process.

Another study by Armier Jr., Shepherd & Skrabut (2016) found that students were motivated to learn in gamified contexts and engaged with more learning tasks by playing games as they were shown to perform well in gaming environment. More, Rapp (2015) found that game elements motivate students only in the first phase of the user journey with leveraging extrinsic motivators, and that the lack of meaningful rewards, progression, and variety impoverish the user experience, instead of providing a gaming experience.

Lister (2015) found that points, badges, awards, leaderboards and levels are used as the

most effective form of gamification elements. It is shown that incorporation of gamification elements in teaching and learning environments highly motivate students and support their learning. Gamification has a positive effect on increased class attendance and students' participation in academic activities that are positively correlated with student improved performance.

Mariia -Blanca, Di-Serio, & Delgado-Kloos (2014) found positive effect of gamification on the engagement of students in learning activities and a moderate enhancement of learning outcomes. Further, Amriani, Aji, Utomo, & Junus (2013) found that applying gamification on a non-gamified context does not significantly affect the students' participation in learning. It is also found that removing gamification from a gamified learning environment decreased students' performance. It shows that the gamification itself created the active atmosphere on the students for both learning systems. The result showed that withdrawing gamification causes significant decrease in learners' engagement in learning while applying gamification does not have a significant impact.

Goehle (2013) studied the effect of the implementation of the gamification approach in an online platform and found that students are more interested and felt more fun with the gamified platform while Barata et al., (2013) found that students spend more time for learning activities as a result of motivation for obtaining points, badges, leaderboard, and receiving positive reactions from peer learners.

Based on the previous literature review, the statement of the problem of this study can be stated to investigate the effect of gamification on students' motivation in a preparatory college course.

Research Question

What is the effect of gamification on students' motivation in a preparatory college course?

Objectives of the Study

The aim of this study is to find out the effect of gamification on university students' motivation that requires investigating the effect of gamification on the sub-motivation components:

- value components
 - intrinsic goal orientation
 - extrinsic goal orientation
 - task value
- expectancy component
 - control of learning beliefs
 - self-efficacy for learning and performance
- Affective Components: test anxiety

Hypothesis of the Study

1. There will be significant effect of gamification on motivation among university students.
2. There will be significant effect of gamification on value components among university students
3. There will be significant effect of gamification on intrinsic goal orientation among university students
4. There will be significant effect of gamification on extrinsic goal orientation among university students
5. There will be significant effect of gamification on task value among university students
6. There will be significant effect of gamification on expectancy components among university students
7. There will be significant effect of gamification on control of learning beliefs among university students
8. There will be significant effect of gamification on self-efficacy for learning and performance among university students
9. There will be significant effect of gamification on test anxiety among university students

Methodology

The study was conducted using a correlational descriptive design. The population of the study is all preparatory year college students who are pursuing the course of "SPEPS-100: University Study Skills" at the university of Jeddah, Saudi Arabia. The sample selected for the study consisted of 334 students who were selected using random sampling technique. The independent variable is gamification and the dependent variable is students' motivation. Students were given gamified online classes using LMS with two gamified strategies i.e. badges and leaderboards with a maximum score of 30. Motivated Strategies for Learning Questionnaire (MSLQ) is used to assess students' motivation for learning (Duncan et al., 2015; Pintrich et al., 1991). The three dimensions of MSLQ i.e., value components, expectancy components, and affective component are considered for assessment. Value components are comprised of intrinsic goal orientation, extrinsic goal orientation and task value. Expectancy components are comprised of control of learning beliefs and self-efficacy for learning and performance. The affective component assesses test anxiety as well. MSLQ is seven-point Likert scale and 31 items are taken from these three dimensions. The reliability coefficient of MSLQ has been reported as .95 and it has higher level construct validity. The statistical tests used for analysis of data are person's correlation and simple linear regression analysis.

Results

H₁. There will be significant effect of gamification on motivation among university students.

Table 1 Regression Coefficients of Gamification on Students' Motivation as whole

Variable	B	β	SE
Constant	49.84***		10.11
Gamification	3.20***	.33	0.5
R^2	.11		

Note. $N = 334$ *** $p < .001$

Table 1 shows the effect of gamification on students' motivation. The R^2 value of .11 revealed that the predictor variable explained 11% variance in the outcome variable with $F(1,332) = 41.54$, $p < .001$. The finding revealed that gamification positively predicted students' motivation ($\beta = .33$, $p < .001$). There is significant effect of gamification

on students' motivation. Hence the alternative hypothesis is accepted.

There will be significant effect of gamification on intrinsic goal orientation among university students.

H₂. There will be significant effect of gamification on value components among university students.

Table 2 Regression Coefficients of Gamification on Value Components

Variable	B	β	SE
Constant	21.77***		4.90
Gamification	1.7***	.36	0.24
R^2	.13		

Note. $N = 334$ *** $p < .001$

Table 2 shows the effect of gamification on value components among university students. The R^2 value of .13 revealed that the predictor variable explained 13 % variance in the outcome variable with $F(1,332) = 49.48$, $p < .001$. The finding revealed that gamification positively predicted the value components among university students

($\beta = .36$, $p < .001$). There is significant effect of gamification on value components among university students. Hence the alternative hypothesis is accepted.

H₃. There will be significant effect of gamification on intrinsic goal orientation among university students.

Table 3 Regression Coefficients of Gamification on Intrinsic Goal Orientation

Variable	B	β	SE
Constant	7***		1.58
Gamification	0.40***	.27	0.07
R^2	.08		

Note. $N = 334$ *** $p < .001$

Table 3 shows the effect of gamification on intrinsic goal orientation among university students. The R^2 value of .08 revealed that the

predictor variable explained 8 % variance in the outcome variable with $F(1,332) = 27$, $p < .001$. The finding revealed that gamification positively

predicted intrinsic goal orientation among university students. ($\beta=.27$, $p<.001$). There is significant effect of gamification on intrinsic goal orientation among university students. Hence the alternative hypothesis is accepted.

H4. There will be significant effect of gamification on extrinsic goal orientation among university students.

Table 4 Regression Coefficients of Gamification on Extrinsic Goal Orientation

Variable	B	β	SE
Constant	6.85***		1.62
Gamification	0.6***	.38	0.08
R^2	.14		

Note. $N = 334$

*** $p<.001$

Table 4 shows the effect of gamification on extrinsic goal orientation among university students. The R^2 value of .14 revealed that the predictor variable explained 14 % variance in the outcome variable with $F(1,332) = 55.69$, $p<.001$. The finding revealed that gamification positively predicted extrinsic goal orientation among

university students. ($\beta=.38$, $p<.001$). There is significant effect of gamification on extrinsic goal orientation among university students. Hence the alternative hypothesis is accepted.

H5. There will be significant effect of gamification on task value among university students

Table 5 Regression Coefficients of Gamification on Task Value

Variable	B	β	SE
Constant	7.92***		2.17
Gamification	0.7***	.34	0.11
R^2	.11		

Note. $N = 334$

*** $p<.001$

Table 5 shows the effect of gamification on task value among university students. The R^2 value of .11 revealed that the predictor variable explained 11% variance in the outcome variable with $F(1,332) = 42.62$, $p<.001$. The finding revealed that gamification positively predicted task value among university students ($\beta=.34$, $p<.001$). There

is significant effect of gamification on task value among university students. Hence the alternative hypothesis is accepted.

H6. There will be significant effect of gamification on expectancy component among university students.

Table 6 Regression Coefficients of Gamification on Expectancy Components

Variable	B	β	SE
Constant	17.68***		4.03

Gamification	1.162***	.37	.20
R^2	.09		

Note. $N = 334$

*** $p < .001$

Table 6 shows the effect of gamification on expectancy components among university students. The R^2 value of .09 revealed that the predictor variable explained 9 % variance in the outcome variable with $F(1,332) = 34.35$, $p < .001$. The finding revealed that gamification positively predicted the expectancy components among

university students ($\beta = .37$, $p < .001$). There is significant effect of gamification on expectancy components among university students. Hence the alternative hypothesis is accepted.

H₇. There will be significant effect of gamification on control of learning beliefs among university students.

Table 7 Regression Coefficients of Gamification on Control Beliefs

Variable	B	β	SE
Constant	6.16***		1.51
Gamification	.33***	.23	.07
R^2	.06		

Note. $N = 334$

*** $p < .001$

Table 7 shows the effect of gamification on control beliefs among university students. The R^2 value of .06 revealed that the predictor variable explained 6 % variance in the outcome variable with $F(1,332) = 19.14$, $p < .001$. The finding revealed that gamification positively predicted the control beliefs among university students ($\beta = .23$,

$p < .001$). There is significant effect of gamification on control beliefs among university students. Hence the alternative hypothesis is accepted.

H₈. There will be significant effect of gamification on self-efficacy for learning and performance among university students

Table 8 Regression Coefficients of Gamification on Self-Efficacy for Learning and Performance

Variable	B	β	SE
Constant	11.52***		2.71
Gamification	.84***	.33	.13
R^2	.11		

Note. $N = 334$

*** $p < .001$

Table 8 shows the effect of gamification on self-efficacy for learning and performance among university students. The R^2 value of .11 revealed that the predictor variable explained 11 % variance in the outcome variable with $F(1,332) = 40$, $p < .001$. The finding revealed that gamification

positively predicted the self-efficacy for learning and performance among university students ($\beta = .33$, $p < .001$). There is significant effect of gamification on self-efficacy for learning and performance among university students. Hence the alternative hypothesis is accepted.

H₉. There will be significant effect of gamification on test anxiety among university student

Table 9 Regression Coefficients of Gamification on Test Anxiety

Variable	B	β	SE
Constant	10.40***		1.67
Gamification	.35***	.22	.08
R^2	.05		

Note. $N = 334$

*** $p < .001$

Table 9 shows the effect of gamification on test anxiety among university students. The R^2 value of .05 revealed that the predictor variable explained 5 % variance in the outcome variable with $F(1,332) = 17.57$, $p < .001$. The finding revealed that gamification positively predicted the test anxiety among university students ($\beta = .22$, $p < .001$). There is significant effect of gamification on test anxiety among university students. Hence the alternative hypothesis is accepted.

Discussion

The study found a significant effect of gamification on students' motivation that enrolled in the preparatory college course, "SPEPS-100: University Study Skills". The prediction of gamification on value components, expectation components and affective components are 11%, 9%, and 5% respectively; this reveals varied range of prediction of gamification on students' motivation. The Study uncovers a significant effect of gamification on students' motivation though it does not report a strong effect of gamification on students' motivation among university students. Lack of strong effect of gamification on motivation among college students may be due to influence other factors like focusing on learning for passing the examination, achieving the higher grades and placements, and compulsion to complete academic works etc. The study revealed that gamification as an innovative method of intrinsic and extrinsic teaching motivated university students to some extent.

There are certain studies that are in line with the findings of this study, that is the effect of gamification on motivation among college students.

The finding of the study is also supported by Sailer (2020) who reported positive effects of gamified learning techniques on intrinsic motivation among students. It is also found in this study with regards to motivational aspects that there is a significant positive effect of gamified quizzes with points and leaderboards on intrinsic motivation among students of higher education. The finding of the study is also supported by Huang, Hew & Lo (2019) who found that learners in the gamification-enhanced flipped learning group produced higher level of academic performance as compared with students who have been taught within non-gamified group in learning activities. The finding of the study is also supported by Imran (2019) who found that students who used gamification techniques got higher level of motivation as compared with students who used non-gamified techniques. It is also reported that engagement across subjects and awards earned was more noticed in gamified as compared with non-gamified environment.

The finding of the study is also supported by Bouchrika et al. (2019) who found that gamification is a potential tool to motivate the learners to uptake of educational systems and enhance students' interactivity and academic engagement as well. The finding of the study is also supported by Kopcha, et al. (2016) who reported that the badges and the reactions of

gamification are helpful in motivating students' social interactions. It is also found that students were motivated by the game dynamics when it was incorporated into the course. The finding of the study is also supported by Buckley & Doyle (2016) who found that there is a positive correlation between the various types of motivation and participation in learning process. Motivation helped for a significant increase in awareness of learners by the gamified learning intervention. The finding of the study is supported by Leaning (2015) who reported in his study that games and gamification enhance students' engagement, experience and achievement among students where the qualitative data and the module feedback forms showed that students enjoyed the programme more in gamified group and also showed a high-level motivation among students in terms of their preparation and learning to a deeper levels. The study concludes that gamification helped for giving motivational affordances among students.

The findings of this study is also supported by Dominguez et al. (2013) who reported that students who used the gamified learning techniques got higher scores in their learning activities in overall score and there was a higher level motivation among students. The study concludes that gamification as a learning technique showed a potential increase in students' motivation and that leaderboards were important sources for motivation because there was a chance for visualisation of students performance as publicly and instantly recognized. The findings is also supported by Abramovich, Schunn, & Higashi (2013) who found that gamification increases students' interest in learning and decreases counter-productive motivational aspects through using gamification badges. It also reported that achieving various badges is increased in expectations for success as a source of motivation. The study found both positive and negative effects of gamification on learning among students. In addition, the findings is also

supported by O'Donnell et al. (2013), who found that the immediate feedback as an aspect of the gamification motivates the learners to strengthen the connection between attempting right choice and being proportionally rewarded for their performance.

The findings of this study are in line with Goehle's (2013) findings. He revealed that some gamification techniques positively influence students' motivation and engagement. It was reported that 93% of the learners engaged with learning tasks to get reward levels and achievements while 89% of the learners actively worked to obtain achievements. The study shows that gamification is important to an extent that arouses the academic motivation among students. The finding of the study is also supported by McDaniel et al. (2012) who reported that game elements such as badges and achievements were motivational in learning activities among students. The findings of the study are also supported by Foster, Sheridan, Irish, & Frost (2012) who found that the gaming elements were potentially perceived to motivate students to fill their knowledge gaps. Students were curious to get stamps by playing and this aroused motivation in them to learn the aspects they had not learnt yet. Descriptions for the achievement given on the gamification board set standards for the type and depth of knowledge that was useful for those teams and individual students who didn't perform well in non-gamified environment.

The findings of the study are also supported by Li, Grossman & Fitzmaurice (2012) as they found that users commented that the game condition was entertaining and engaging, which motivated them to challenge themselves, immerse them in the learning tasks, achieve higher scores and levels accordingly. It is also revealed that students who use the gamified system have shown higher subjective engagement levels and performed a set of testing tasks faster with a higher completion ratio than students who are in non-gamified learning environment. The findings

are also supported by Gasland (2011) who found that students perceived the points-based gamification techniques as motivating to some extent and quite engaging. This motivation is supposed to be a result of the fact that points encouraged the learners with instant feedback and recognition for the completion of learning activities. It was also reported that the selected game mechanic was more interesting in arousing the motivation in earners though the effect was not so strong. The finding are also partially supported by Haaranen, Ihantola, Hakulinen, & Korhonen (2014) who reported that only one-third of college students were motivated by the badges while one-third were indifferent towards the badges and the remaining one-third did not find the badges as motivating for their learning. The study didn't reveal a strong effect of gamification on motivation among college students. The findings were also supported by Armier Jr. et al. (2016) who indicated a significant difference hour among students who have been taught through gamified learning environment and non-gamified learning environment. It shows that gamification influenced gamification among students. The findings are in consistent with Charles, McNeill, Bustard, & Black's (2011) findings where they reported that academically low-performing students are motivated by a gamified environment than academically high-performing students. It shows that gamification has the potential to seek the attention of underachievers and slow learners. However, some findings in the study were not in line with Chapman & Rich (2018) who reported no significant correlations between overall motivation for the gamified course and any demographic variable. They revealed that age, gender, hours worked per week, or student status are not predictors of motivation for gamifications. Some other findings of this study is not in line with Kyewski & Krämer (2018) who reported no motivational effect of badges in online mode of course over time as badges have less effect on motivation and performance than is generally

assumed. Badges were not potential to encourage enhancement of intrinsic motivation of students over time. Again, some other findings in this study were not in line with Hanus & Fox (2015) who found no significant effect of gamification on motivation among students in the gamified learning environment. Berkling & Thomas (2013) contradicts some of the findings of this study where they reported that there was no significant effect of gamification on motivation among students in the gamified learning environment. The benefits of a gamified environment for the classroom activities were not evident to the students and showed a mismatch of expectations when used the gamification in context of the academic activities.

Conclusion

Motivation is paramount in every teaching and learning practice. Students' emotional and behavioral engagement can be enhanced by only sufficient motivation that may be either intrinsic or extrinsic form. This study explored many dimensions to reveal the effect of gamification on university preparatory year students' motivation. The study relied on a quantitative approach to measure students' motivation such as intrinsic goal orientation, extrinsic goal orientation, task value, and control learning beliefs, self-efficacy for learning and performance and text anxiety of learners throughout the gamification process. Results suggested that badges and leaderboards are important measures of motivation in their learning experiences exposed to gamification. The results have shown a considerable positive effect of gamification on motivation among college students. The contribution of this work is in the understanding of how gamified techniques affect the learner's motivation based on their academic engagement. In particular, it contributed to the understanding of how gamification affects different dynamics of motivated learning behavior among university students due to their exposure to gamified learning environment. The study

recommends incorporating more game elements in teaching and learning environment that can motivate students with enhanced engagement. A multidisciplinary approach for studying the effects of gamification on students' academic engagement and motivation is nascent, yet there is a burgeoning need for the exploration of a wider range of innovative game elements and game dynamics across various academic contexts, effective experimental designs, and investigations of several trajectories that can be incorporated for gamified teaching and learning practices.

Limitations of the Study

The study has certain limitations; the population of study is limited only to the students at university of Jeddah, Saudi Arabia. The students were taken only from preparatory year students who are pursuing SPEPS-100: University Study Skills'. Only badges and leaderboard were taken as gamification strategies and three dimensions of motivation were taken for the assessment of students' motivation.

Acknowledgment:

Funding: No funding

Compliance with Ethical Standards: The authors assure that this research paper was done in compliance with Ethical Standards.

Conflict of Interest: The authors declare that they have no conflict of interest in this research.

References

- [1] Abramovich, S., Schunn, C., & Higashi, R. (2013). Are badges useful in education?: It depends upon the type of badge and expertise of learner. *Educational Technology Research and Development*, 61(2), 217 - 232.
- [2] Abrams, S. S., & Walsh, S. (2014). Gamified vocabulary. *Journal of Adolescent & Adult Literacy*, 58(1), 49–58.
- [3] Amriani, A., Aji, A.F., Utomo, A.Y., Junus, K.M. (2013). An empirical study of gamification impact on e-learning environment. In *Proceedings of 3rd International Conference on Computer Science and Network Technology*, 265- 269.
- [4] Annansingh, F. (2017). An investigation in to the gamification of e-learning in higher education. In: Alphin Jr, H.C., Lavine, J., & Chan, R.Y (Eds.). *Disability and Equity in Higher Education Accessibility*. City University of New York – York College, USA.
- [5] Appleton, J. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology*, 45(5), 369–386.
- [6] Armier Jr., D.D., Shepherd, C.E., & Skrabut, S. (2016) Using Game Elements to Increase Student Engagement in Course Assignments, *College Teaching*, 64(2), 64-72, DOI: 10.1080/87567555.2015.1094439.
- [7] Barata, G., Gama, S., Jorge, J., & Gonçalves, D. (2013). Improving participation and learning with gamification. In *Proceedings of the First International Conference on gameful design, research, and applications* 10-17. ACM.
- [8] Berkling, K., & Thomas, C. (2013). Gamification of a software engineering course and a detailed analysis of the factors that lead to its failure. In *Proceedings of International Conference on Interactive Collaborative Learning*, 525-530. doi:10.1109/ICL.2013.6644642
- [9] Bouchrika, I., Harrati, N., Wanick, V, & Wills, G. (2019). Exploring the impact of gamification on student engagement and involvement with e-learning systems, *Interactive Learning Environments*, DOI: 10.1080/10494820.2019.1623267.
- [10] Buckley, P., & Doyle. (2016). Gamification and student motivation, *Interactive learning environments*, 24(6), 1162-1175, DOI: 10.1080/10494820.2014.964263.
- [11] Bunchball (2010). *Gamification : An Introduction to the Use of Game Dynamics*

- to Influence Behaviour. Retrieved from: www.bunchball.com.
- [12] Chapman, J.R & Rich, P.J. (2018) Does educational gamification improves students' motivation? If so, which game elements work best? *Journal of Education form Business*, 93(7), 315-322, DOI: 10.1080/08832323.2018.1490687.
- [13] Charles, D., Charles, T., McNeill, M., Bustard, D., & Black, M. (2011). Game-based feedback for educational multi-user virtual environments. *British Journal of Educational Technology*, 42(4), 638-654. doi:10.1111/j.1467-8535.2010.01068.x
- [14] Cheong, C., Filippou, J., & Cheong, F. (2014). Towards the gamification of learning: Investigating student perceptions of game elements. *Journal of Information Systems Education*, 25(3), 233–244.
- [15] Cramer, H., Rost, M., & Holmquist, L.E., (2011). Performing a check in: emerging practices, norms and “conflicts” in location sharing using four square. In: *Proceedings of the 13th International Conference on Human–Computer Interaction with Mobile Devices and Services*. ACM, 57–66.
- [16] Cronk, M. (2012). Using Gamification to increase student engagement and participation in class discussion. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2012*, Denver, Colorado, USA. <http://www.editlib.org/p/40762>.
- [17] Cunningham, C., Zichermann, G. (2011). *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. O'Reilly Media, Sebastopol, CA.
- [18] De Bono, E. (1995). *Parallel thinking: From Socratic thinking to de Bono thinking: Language, Linguistics.*, London, UK: Penguin
- [19] Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuit: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11(4), 227–268. doi:10.1207/
- [20] Decker, A., & Lawley, E. L. (2013). Life's a game and the game of life: how making a game out of it can change student behaviour. In *Proceeding of the 44th ACM technical symposium on Computer Science Education*, 233–238. doi:10.1145/2445196.2445269.
- [21] de-Marcos, L., Domínguez, A., Saenz-de-Navarrete, J., & Pagés, C. (2014). An empirical study comparing gamification and social networking on e-learning. *Computers & Education*, 75, 82–91. doi:10.1016/j.compedu.2014.01.012.
- [22] Denny, P., McDonald, F., Empson, R., Kelly, P., & Petersen, A. (2018). Empirical support for a causal relationship between gamification and learning outcomes. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, Montreal QC, Canada.
- [23] Deterding, S. (2012). Gamification: designing for motivation. *Interactions*, 19, 14–17.
- [24] Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness. *Defining gamification*. In *Proceedings of the 15th International Academic Mind Trek Conference: Envisioning Future Media Environments*. ACM, Tampere, Finland, 9–15.
- [25] Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification: Using game-design elements in non-gaming contexts. In *Proceedings of the CHI 2011*. Vancouver, BC, Canada, 10.1145/1979742.1979575.
- [26] Ding, L., Erkan E, Orey, M. (2018). An exploratory study of student engagement in gamified online discussions. *Computers &*

- Education 120, 213–226.
<https://doi.org/10.1016/j.compedu.2018.02.007>.
- [27] Dominguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernandez-Sanz, L., Pages, C., Martinez-Herraz, J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, 63, 380 - 392.
- [28] Drace, K. (2013). Gamification of the laboratory experience to encourage student engagement. *Journal of Microbiology & Biology Education*, 14(2), 273–274.
- [29] Duncan, Teresa & pintrich, paul & smith, david & Mckeachie, Wilbert. (2015). Motivated Strategies for Learning Questionnaire (MSLQ) Manual. 10.13140/RG.2.1.2547.6968.
- [30] Farber, M. (2015). Gamify your classroom. A field guide to game-based learning. New York, NY: Peter Lang. doi:10.3726/978-1-4539-1459-5.
- [31] Fitz-Walter, Z.,Tjondronegoro, D., & Wyeth, P. (2012).Agamified mobile application for engaging new students at university orientation. In: Proceedings of the 24th Annual Conference of the Australian Computer–Human Interaction Special Group. ACM, Melbourne, Australia, 138–141.
- [32] Foster, J.A., Sheridan, P.K., Irish, R., & Frost, G.S. (2012). Gamification as a strategy for promoting deeper investigation in a reverse engineering activity. In Proceedings of the 2012 American Society for Engineering Education Conference, AC 2012–AC 5456.
- [33] Fredricks, J. A., Blumenfeld, P. C., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*. 74, (1), 59–109.
- [34] Gasland, M. M. (2011). Game Mechanic based E-Learning: A case study. Retrieved from: <http://ntnu.diva-portal.org/smash/get/diva2:441760/FULLTEXT01>
- [35] Glover, I. (2013). Play as you learn: Gamification as a technique for motivating learners. In: Herrington, J., Couros, A., & Irvine, V. (Eds.) *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 1999–2008*. Chesapeake, VA: AACE.
- [36] Goehle, G. (2013). Gamification and Web-based Homework. *Primus: Problems, Resources, and Issues in Mathematics Undergraduate Studies*. 23, 234–246. <http://dx.doi.org/10.1080/10511970.2012.736451>.
- [37] Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? -- A literature review of empirical studies on gamification. In *Proceedings of 47th Hawaii International Conference on System Sciences*, 3025-3034. doi:10.1109/HICSS.2014.377
- [38] Hanus, M. & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education*, 80, 152 - 161.
- [39] Huang, B., Hew, K.F., & Lo, C.K. (2019) Investigating the effects of gamification enhanced flipped learning on undergraduate students’ behavioural and cognitive engagement, *Interactive learning environments*, 27(8), 1106-1126, DOI: 10.1080/10494820.2018.1495653.
- [40] Huang, B., & Hew, K. F. (2018). Implementing a theory driven gamification model in higher education flipped courses: Effects on out-of-class activity completion and quality of artefacts. *Computers & Education*, 125, 254–272. <https://doi.org/10.1016/j.compedu.2018.06.018>.
- [41] Hunicke, R., Leblanc, M., & Zubek, R. (2004). MDA: A formal approach to game

- design and game research. *Discovery*, 83(3), 1–5.
- [42] Huotari, K., & Hamari, J. (2012). Defining gamification: a service marketing perspective. In *Proceeding of the 16th International Academic Mind Trek Conference*.
- [43] Imran, H. (2019). Evaluation of awarding badges on Student's engagement in Gamified e-learning systems. *Smart Learn. Environment*, 6, (17). <https://doi.org/10.1186/s40561-019-0093-2>.
- [44] Johnson, L., Adams, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). *The NMC Horizon Report: 2013 Higher Education Edition*.
- [45] Huotari, K., & Hamari, J. (2012). Defining Gamification: A Service Marketing Perspective. In *Proceeding of the 16th International Academic MindTrek Conference (17-22)*. New York, NY: ACM.
- [46] Kapp, K. M. (2015). Reflections on Gamification for Learning. Available from: <http://karlkapp.com/2014-reflections-on-gamification-for-learning>
- [47] Kapp, K.M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. Pfeiffer; SanFrancisco, CA.
- [48] Khan, A & Ahmad, F.H & Malik, M.M. (2017). Use of digital game based learning and gamification in secondary school science: The effect on student engagement, learning and gender difference. *Educational Information Technology*, 22(6), 2767–2804. DOI 10.1007/s10639-017-9622-.
- [49] Khalil, M., Ebner, M., Admiraal, W. (2017). How can gamification improve MOOC student engagement?. In: *The 11th European Conference on Game-Based Learning ECGBL'17*, . 819–828.
- [50] Kim, S., Song, K., Lockee, B., & Burton, J. (2018). Theories for gamification in learning and education gamification. In *Gamification in learning and education*, 39–47. Cham, Switzerland: Springer.
- [51] Kiryakova, G., Angelova, N., & Yordanova, L. (2014). Gamification in education, In *Proceedings, 9th International Balkan Education, and Science Conference*, 1–5. DOI:10.4018/978-1-5225-5198-0.
- [52] Kolb, D. A. (1984). *Experiential learning*. Englewood Cliffs, NJ: Academic Press.
- [53] Kopcha, T , K., & Lu, D., & Kalliane, N., & Ikseon, C. (2016). Teaching Technology Integration to K-12 Educators: A 'Gamified' Approach. *Tech Trends*. 60(1). 10.1007/s11528-015-0018-z.
- [54] Kuh, G. D. (2009). What student affairs professionals need to know about student engagement. *Journal of College Student Development*, 50 (6), 683–706. doi:10.1353/csd.0.0099.
- [55] Kusuma, G. P., Wigati, E. K., Utomo, Y., & Suryapranata, L. K. (2018). Analysis of gamification models in education using MDA framework. *Procedia Computer Science*, 135, 385–392. doi.org/10.1016/j.procs.2018.08.187
- [56] Kyewski, E., & Krämer, N.C. (2018). To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course. *Computer Education*. 118, 25–37. <https://doi.org/10.1016/j.compedu.2017.11.006>
- [57] Lambert, J., & Ennis, J. (2014). Quest-based learning: A new approach to pre service teacher technology instruction. In *Proceedings of Information Technology & Teacher Education International Conference*.
- [58] Lee, J. J., & Hammer, J. (2011). Gamification in education: What, how, why bother? Definitions and uses. *Exchange Organizational Behaviour Teaching Journal*, 15(2), 1–5.

- [59] Li, W., Grossman, T., Fitzmaurice, G., (2012). GamiCAD: a gamified tutorial system for first time Auto CAD users. In: Proceedings of the 25th Annual ACM Symposium on User Interface Software and Technology. ACM, Cambridge, MA, 103–112.
- [60] Lin, N. (2014). Assessing classroom participation and performance through gamification systems in foreign language classrooms. In Proceedings of Society for Information Technology & Teacher Education International Conference.
- [61] Lister, M. C. (2015). Gamification: The effect on student motivation and performance at the postsecondary level. *Issues and Trends in Educational Technology*, 3(2). doi:10.2458/azu_itet_v3i2_Lister.
- [62] Lo, C. K., & Hew, K. F. (2018). A comparison of flipped learning with gamification, traditional learning, and online independent study: The effects on students' mathematics achievement and cognitive engagement. *Interactive Learning Environments*, 1–18. <https://doi.org/10.1080/10494820.2018.1541910>.
- [63] López, A., Rincón-Flores, E.G., Juanjo.M., García-Peñalvo, F.J., Ramírez-Montoya, M.S. (2019). Universal access in the information society, Springer, 18, 583–597 <https://doi.org/10.1007/s10209-019-00680-z>.
- [64] Mariia -Blanca I., Di-Serio, A., & Delgado-Kloos, C. (2014). Gamification for engaging computer science students in learning activities: A case study. *IEEE Transactions on learning technologies*, 7(3), 291-300.
- [65] Martens, R., Gulikers, J., & Bastiaens, T. (2004). The impact of intrinsic motivation on e-learning in authentic computer tasks. *Journal of Computer Assisted Learning*, 20(5), 368–376. doi:10.1111/j.1365-2729.2004.00096.x
- [66] McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can Change the world*. London: UK: Jonathan Cape.
- [67] Mekler, E., Brühlmann, F., Opwis, K., & Tuch, A. (2013a). Disassembling gamification: The effects of points and meaning on user motivation and performance. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI EA'13), 1137-1142. doi:10.1145/2468356.2468559
- [68] Mekler, E., Brühlmann, F., Opwis, K., & Tuch, A. (2013b). Do points, levels and leaderboards harm intrinsic motivation? An empirical analysis of common gamification elements. In Proceedings of the First International Conference on Gameful Design, Research, And Applications, 66-73. doi:10.1145/2583008.2583017
- [69] Nicholson, S. (2012). A user-centered theoretical framework for meaningful gamification. In Proceedings of Games Learning Society, 8.0. Madison, WI.
- [70] O'Donovan, S., Gain, J., Marais, P. (2013). A case study in the gamification of a university-level games development course. In Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference, 242–251.
- [71] Ofosu-Ampong, K, Boateng, R, Anning-Dorson, T & Kolog, E.A (2019). Are we ready for Gamification? An exploratory analysis in a developing country. *Education and Information Technologies*. Springer, 25, 1723–1742. <https://doi.org/10.1007/s10639-019-10057-7>.
- [72] Osterweil, S. (25 April, 2007). *The Four Freedoms of Play*, HBS.[video]. You Tube. <https://youtu.be/UjarYsSHNwY>.

- [73] Palomino, P.T., Armando, T.M & Wilk, O., Alexandra, C., & Seiji, I. (2019). Narrative for gamification in education: Why should you Care? In Proceedings of IEEE 19th International conference on advanced learning technologies .10.1109/ICALT.2019.00035.
- [74] Pian, A. (2017). Gamification: Teaching while playing – Open issues and educational guidelines, In Handbook of research on collaborative teaching practice in virtual learning environments. IGI Global, DOI: 10.4018/978-1-5225-2426-7.ch006.
- [75] Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). Ann Arbor, Michigan: National Centre for Research to Improve Postsecondary Teaching and Learning.
- [76] Bottom of Form
- [77] Poondej, C., Lerdpornkulrat, T. (2016). The development of gamified learning activities to increase student engagement in learning. Australian Educational Computing, 31(2).
- [78] Rahman, R.A., Sabrina Ahmad, & Hashim, U.R. (2018). The effectiveness of gamification technique for higher education students' engagement in polytechnic Muadzam Shah Pahang, Malaysia. International Journal of Educational Technology in Higher Education 15(41), 1-16. <https://doi.org/10.1186/s41239-018-0123-0>.
- [79] Rapp, A. (2015). A qualitative investigation of gamification: Motivational factors in online gamified services and applications. International journal of technology and human interaction, 11(1). 67-82 DOI: 10.4018/ijthi.2015010105.
- [80] Raymer, R. (2011). Gamification: using game mechanics to enhance eLearning. Available from <http://elearnmag.acm.org/featuredcfmaid=2031772>.
- [81] Reeves, B., & Read, J. L. (2009). Total engagement: Using games and virtual worlds to change the way people work and businesses compete. Boston: Harvard Business Press.
- [82] S15327965PLI1104_01.
- [83] Salen, K., & Zimmerman, E. (2003). Rules of Play: Game Design Fundamentals. The MIT Press. Cambridge, MA, p-80.
- [84] Sanchez-Martin, J., & Davila-Acedo, M. A. (2017). Just a game? Gamifying a general science class at university: Collaborative and competitive work implications.
- [85] Thinking Skills and Creativity, 26, 51–59. <https://doi.org/10.1016/j.tsc.2017.05.003>.
- [86] Schell, J. (2008). The Art of Game Design: A Book of Lenses. Abingdon: Taylor & Francis.
- [87] Seaborn, K., Fels, D.I., Bajko, R., & Hodson, J.(2017). Gamifying the media classroom: instructor perspectives and the multidimensional impact of gamification on student engagement. International Journal of Game-Based Learning.7 (4), 22-49. DOI: 10.4018/IJGBL.2017100102.
- [88] Sheldon, L. (2011). The multiplayer classroom: Designing coursework as a game. Boston, MA: Cengage Learning.
- [89] Smiderle, R., Rigo, S.J, Marques, L.B., Coelho, J.R., & Jaques, P.A. (2020) .The impact of gamification on students' learning, engagement and behaviour based on their personality traits. Smart Learning Environments, 7(3), 1-11, <https://doi.org/10.1186/s40561-019-0098-x>.
- [90] Sriratnasari, S.R. ,Wang, G., & Kaburuan, E. R. (2019). Applying innovative learning management system (lms) with gamification framework. In proceedings of International seminar on application technology of information and communication. 569-573. 10.1109/ISEMANTIC.2019.8884295.

- [91] Snyder, E., & Hartig, J., (2013). Gamification of board review: a residency curricular innovation. *Medical Education* 47, 524–525. <http://dx.doi.org/10.1111/medu.12190>.
- [92] Tan, M., & Hew, K. H. (2016). Incorporating meaningful gamification in a blended learning research methods class: Examining student learning, engagement, and affective outcomes. *Australasian Journal of Educational Technology*, 32(5), 19–34. doi:10.14742/ajet.2232.
- [93] Tsay, C., Kofinas, A.K., & Luo, J. (2018). Enhancing student learning experience with technology-mediated gamification: an empirical study, *Computers and Education*, 121, 1-17.
- [94] Werbach, K., Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Wharton Digital Press, Philadelphia, PA.
- [95] Wiggins, B. E. (2016). An overview and study on the use of games, simulations, and gamification in higher education. *International Journal of Game-Based Learning*, 6(1), 18-29. DOI: 10.4018/IJGBL.2016010102.
- [96] Wood, L. C., & Reiners, T. (2012). Gamification in logistics and supply chain education: Extending active learning. In. Kommers, T. P, & Isaías, P. (Eds.), *IADIS International Conference on Internet Technologies & Society* 101–108. Perth, Australia: IADIS Press.
- [97] Zainuddin, Z., Shujahat, M., Haruna, H., Wah Chu, S.K. (2020). The role of gamified e- quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system. *Computers & Education* 145, 103729. <https://doi.org/10.1016/j.compedu.2019.103729>.