

Gamification Approach in Education to Increase Learning Engagement

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Abstract: This study aims to discuss the steps of the gamification approach in education to improve learning engagement. There are a few steps on the gamification approach that have been applied by several researchers in this era. The gamification method was used in this study, which contained game elements and game design methods in a non-game context. Six gamification categories for teaching and learning are briefly discussed in this paper: (i) Courses without online support; (ii) MOOC; (iii) Blended/ Flipped Learning; (iv) E-Learning Site; (v) Gamified Platform/ System; and (vi) Mobile Application. The proposed gamification approach in education can also be a guideline for other researchers. Results show that most of the respondents prefer to get rewards during the learning process, follow by level, avatar, and points.

Keywords: Gamification approach, online learning, engagement, gamification categories

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INTRODUCTION

Gamification is the concept of applying game mechanics to engage and motivate students in learning. In other words, games nowadays are a part of students daily life. They spend a lot of time to play games. In order to engage student learning, the gamification method was used, which contained game elements and game design methods in a non-game context. Furthermore, using this method can help to improve learning engagement, suit learners learning style, and provide more adaptive learning. This gamification method has been used by researchers since a few years ago. Past studies showed that there was less engagement among students in building knowledge because often times, the students were treated as ordinary technology users (Tan & Hew, 2016). The solution of accessing this information freely is needed to overcome this situation. Several researchers stated that gamification has the potential for a positive impact on performance, productivity, and user engagement (Simões, Redondo, & Vilas, 2013). By implementing gamification, students will improve themselves in getting good results. The utilisation of the gamification method means that students will learn with academic materials with the use of game elements and cater different styles of learning (Arockiyasamy, Surenderan, & Bullard, 2016; McGrath & Bayerlein, 2013).

Engage can be defined when user wanted to learn or to occupy the intentions or efforts of a persons (Keene, 2014).

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In order word, engagement focuses on keeping learners attention for long time. Without engagement, learners will not be motivating to do the task. Table 1 represents the reasons learners didnt engage with online learning. In education, there are at least four categories of gaming, which are shows in Figure 1.

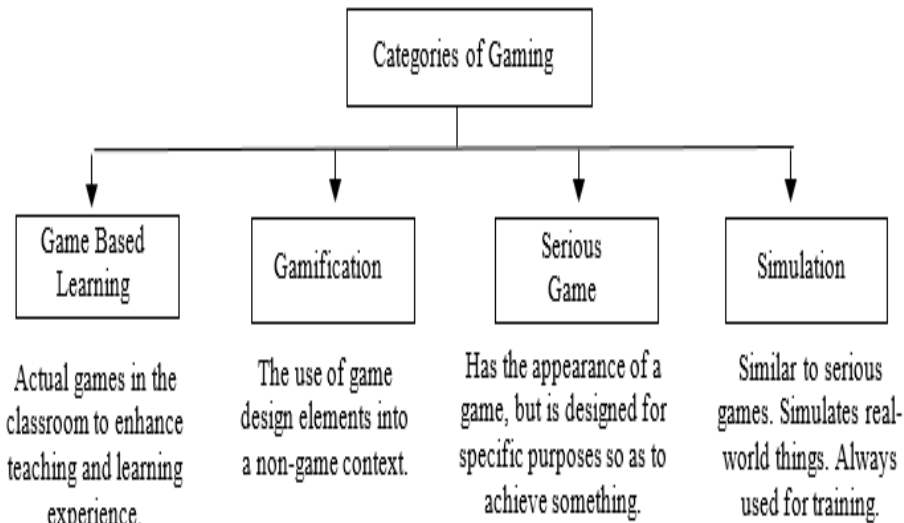


Figure 1 Categories of Gaming

Table 1 Reasons Learners Didn't Engage with Online Learning

Reasons	31	32	33	34	35
Unable to understand lessons			X		
Time Limitation	X				
Learning materials	X		X		
Assessment unperformed		X			X
No Encouragement		X			
Language Barrier		X			
Instructor Accessibility Passion			X		
Peer Interaction With Instructor			X		
Compare Score				X	
Explore Learners				X	

Game-Based Learning

Game-based learning refers to actual games in the classroom to enhance teaching and learning experience. In other words, educators can use video games in the teaching and learning process to attract and motivate students attention.

Gamification

Gamification refers to the use of game design elements into a non-game context and can be divided into: (i) game mechanics; (ii) game characteristics; and (iii) game dynamics. Figure 2 shows the elements of each category.

Serious Games

A serious game looks just like an ordinary game. As mentioned by Darejeh and Salim (2016), there are four types of serious games: (i) Game for teaching; (ii) Simulator game; (iii) Meaningful game; and (iv) Purposeful game.

Simulations

As cited by Padilla et al. (2016), simulations provide an efficient and effective way to learn because learning with simulation is quite different, whereby learners can perform experiments, vary input variables, observe and record output, and reflect on the results. Thus, simulation-based learning is more than a single activity and can be seen as a series of activities that move between using and creating simulations, fulfilling different advantages in terms of learning efficiency and depth.

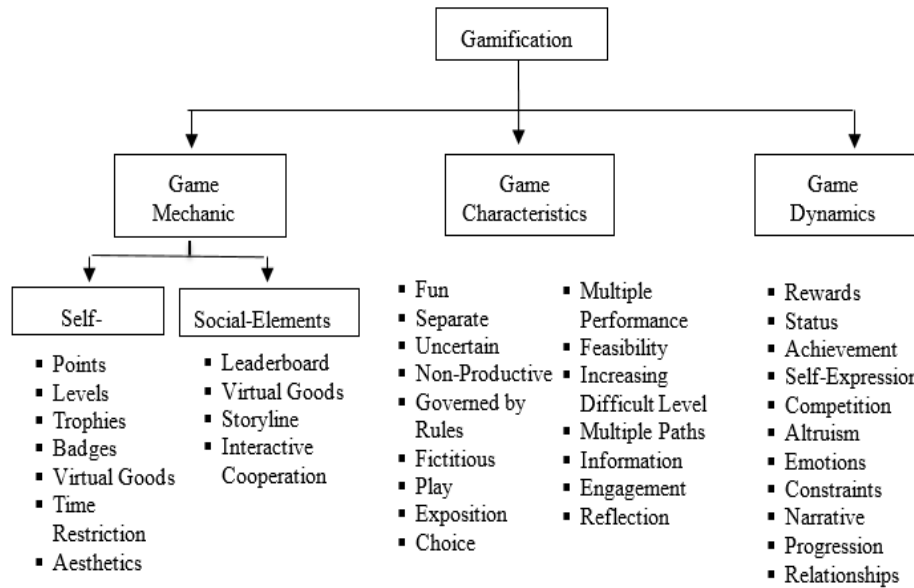


Figure 2 Gamification

RELATED WORKS

Dicheva and Dichev (2015) highlighted the gamification categories for teaching and learning as shown in Figure 3. For this study, gamification can be apply to all categories.

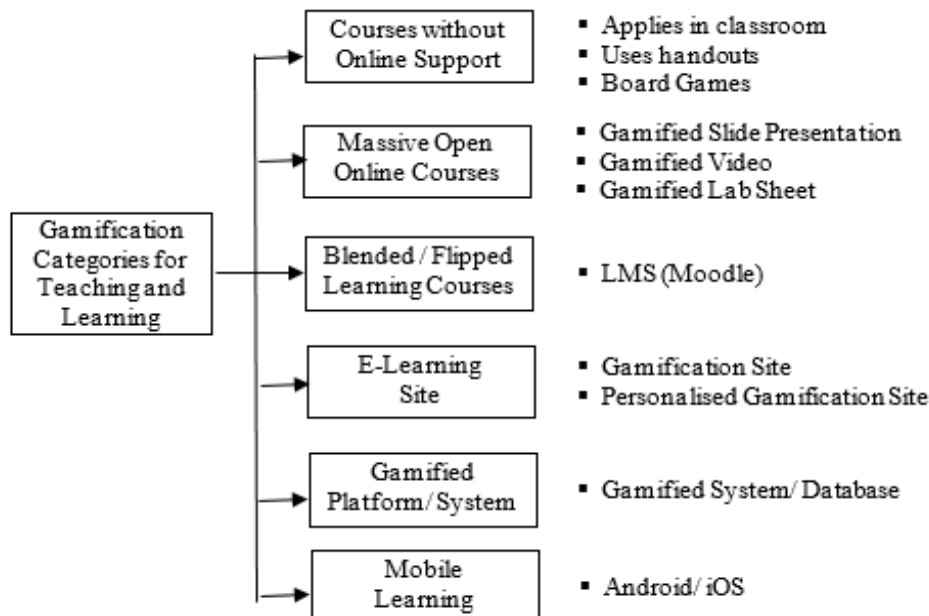


Figure 3 Gamification Categories for Teaching and Learning

Courses without Online Support

Applying gamification in the classroom without online support can also engage student learning in class. Normally, educators can design a board game or tabletop game (Figure 4) to deliver the content during class. Additionally, badges and trophies can be made by using stickers or paper if students complete the mission or goal of learning. Besides that, it depends on the educators whether they can prepare a physical reward or give experience points to each student. All the data or points can be recorded on the gamification board prepared by the educators themselves.

Other than that, gamification handouts and presentation slides can be used in the classroom to attract students attention. Students are allowed to revise and resubmit assignments until the end of the semester in order to make sure students make an improvement of all assignments they submit. From this view, students are free from failing in their class. Students will make an effort to redo their assignment until both educator and students are satisfied with the output.

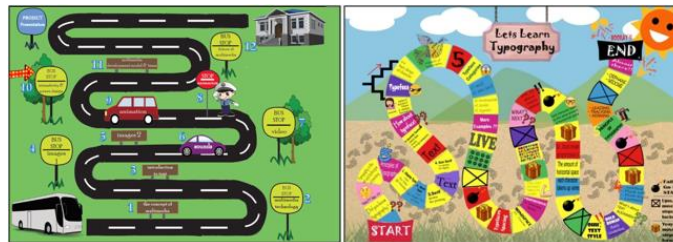


Figure 4 Example of Course Map and Board Game

MOOC

Massive Open Online Courses or MOOCs refer to web platforms that allow an unlimited number of students or learners to access resources and contents anywhere and anytime. Among the popular MOOC platforms are Udacity, edX, Open Learning, and Coursera. MOOCs offer the learning of specific concepts by magnifying, enhancing, and guiding the cognitive developments of learners (Altbach, 2014). Gamification in the MOOC platform means to provide interactive, creative, and interesting learning content, with the integration of game elements that are used for teaching and learning. The study by Chauhan (Chauhan, Taneja, & Goel, 2015; Hashim, Salam, & Mahfuzah Mohamad, 2017) enhanced MOOC through the Augmented Reality technology, adaptive learning as well as applying gamification in the MOOC platform. Previous studies showed that there is significant improvement in learner engagement. Figure 5 is the example of gamification applied in MOOC via the Open Learning platform.

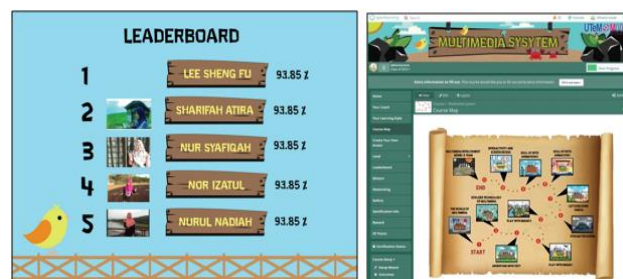


Figure 5 Example of Leaderboard and Progress Bar

Blended and Flipped Learning

Tan and Hew (2016) incorporated meaningful gamification in a blended learning class to examine student learning and engagement. The finding shows that the badge system can significantly increase forum participation, whereas the process bar motivates students to complete their learning as soon as possible to continue to the next activity or level. Lecturers also can implement flipped learning as a teaching strategy, whereby learners are required to learn online using e-content and e-activities prepared by lecturers prior to a face-to-face learning session. A face-to-face learning session is not a lecture form anymore, but more towards student-centered learning activities and the use of higher order thinking skills among learners. It employs asynchronous video lectures and practice problems as homework, and lastly conducts the group-based problem-solving activities in the classroom.

E-Learning Site

A few studies were carried out on how to relate the Multiple Intelligence (MI) concept in institutes of higher learning. Furthermore, instructors also face challenges on how to apply MI in their lessons (Salam, Mohamad, Bakar, & Sui, 2014). The efficiency and effectiveness of teaching are still imperfect based on previous experiments. Educators should plan a way that can involve as many of the intelligences as possible because applying these intelligences gives the students accomplishments (González, Toledo, Muñoz, et al., 2016). The previous educational website did not have gamification elements in it. This problem may cause boredom, lack of interest with the website or motivation, and may not be able to allow users to use the application for a long-term period. Hence, implementing the gamification elements into an educational website can help to overcome these problems.

Gamified Platform/ System

A gamified system is used to motivate students reading and learning contents. The system can also create indicators of student engagement such as average pages per visit or average on site. However, facilitators are needed to create a dynamic interaction in the learning process (Chang, 2017; Souza-Concilio & Pacheco, 2013). From the gamified system, students can obtain contents, and check their score, badges, and also trophies. Educators can check the completion track, total logins and visits on the forum. The most useful game mechanics in the gamified software as mentioned in Darejeh and Salim (2016) are story, clear goal, challenge, time limit, progression, immediate feedback, reward, level, badge, status, achievement, contextual, type of reward, and reward usage.

Mobile Learning

Smartphone is a priority gadget for people nowadays, even for students. Mobile applications can be a good learning way for students to make learning more attractive. Playing games using mobile applications can make students engage in their learning process. This gamification method can make them feel like they are playing a game because they have to win the challenges, complete the levels to get badges and trophies, as well as make the students eager to try and earn the rewards (Chadyiwa & Mgutshini, 2015; Khaddage, Lattemann, & Acosta-Díaz, 2014). Based on Hamari, Koivisto, and Sarsa (2014), mobile applications have been a trending object and subject for user engagement and have helped to improve positive patterns in their learning. There are many mobile applications for learning that have been developed; however, only a few of the mobile applications use gamification as their theme interaction for the students. Vassileva (2012) claimed that gamification may cause short motivation among the users; whereas, others researchers (Chee-wei et al., 2017; Nicholson, 2015) stated that gamification can improve motivation and engage student learning. Applying gamification without knowing what is gamification can be hard; therefore, the understanding of gamification is needed so as to identify its benefits. Other than that, gamification is designed for applying game elements in learning, but if it is poorly designed, the students will find it hard to accept it (Lister, 2015) as well as to identify the suitable game elements that can affect motivational mechanisms (Sailer, Hense, Mandl, & Klevers, 2013). Figure 6 is the example of gamification mobile apps for primary schools towards learning about ICT.



Figure 6 *Gamification Mobile App for Primary School*

RESEARCH METHODOLOGY

A survey of the literature study was conducted in order to gain information about the gamification approach in education that can improve learning engagement. A deep search was applied through online databases such as Scopus, ACM Digital Library, IEEE, Springer, Science Direct, Google Scholar, as well as papers from Research Gate. The source types include journals paper, proceedings, e-books, and articles within the years 2013-2017. Keywords such as 'gamification', 'gamification approach', 'gamification + adaptive learning', and 'gamification + design' were used to search related articles. This study conducted a pilot test that involved 30 higher education students to use gamified e-learning sites.

ANALYSIS OF THE LITERATURE STUDY

In this part, there are a few steps of the gamification approach that have been mentioned by several researchers as shown in Table 2.

Table 2 *Gamification Approach*

Step	Gamification Approach	Ref
1	Determining Learner Characteristics Understanding the Target Audience and Context Division of Learning Content	(Kiryakova, Angelova, & Yordanova, 2014) (Hsin-Yuan Huang & Soman, 2013) (Khaleel, Ashaari, Meriam, Wook, & Ismail, 2016)
2	Understanding the Player Definition of Learning Objectives General Instructional Goals, Specific Learning Goals, and Behavioural Goals Gamification Data (Test and Solution, Mini Exam, Scoring System, Dashboard, Reporting, Goal, Level)	(Kumar & Herger, 2013) (Hsin-Yuan Huang & Soman, 2013) (Khaleel et al., 2016)
3	Thinking through Content and Structure Creation of Educational Content and Activities Structuring the Experience Interface Design	(Kiryakova et al., 2014) (Hsin-Yuan Huang & Soman, 2013) (Khaleel et al., 2016)
4	Understanding Human Motivation Identifying Resources Identifying Stage Applying Game Mechanics	(Kumar & Herger, 2013) (Hsin-Yuan Huang & Soman, 2013)
5	Applying Gamification Elements Managing/ Monitoring/ Measuring	(Hsin-Yuan Huang & Soman, 2013) (Kumar & Herger, 2013)
6	Considering Legal and Ethical Issues	(Kumar & Herger, 2013)

Propose Gamification Approach in Education

Based on the analysis of literature study about gamification, Figure 7 shows the proposed gamification approach in education.

Determining Student Intelligence: Wu, Zhu, and Luo (2015) stressed that understanding target students is the main factor to success in education. González et al. (2016) applied adaptation and personalisation through the Intelligent Tutorial System to offer different interface elements to learners. They used different techniques to suit learners preference as well as define user profile and learning content that allow the personalisation. S. N. M. Mohamad (2014) also applied the theory of multiple intelligences in their study to motivate student learning and provide suitable teaching tools that match the students strength. Barata, Gama, Jorge, and Gonçalves (2015) suggested that different types of students may be drawn towards gamification in different ways. A few studies were conducted on how to

relate the multiple intelligence concept in institutes of higher learning. Furthermore, instructors also faced challenges on how to apply multiple intelligences in their lessons (S. Mohamad, Sazilah, Mohd, Norasiken, & Linda, 2014; S. N. M. Mohamad, Salam, Bakar, & Sui, 2014). The efficiency and effectiveness of teaching are still imperfect based on previous experiments. Educators should plan a way that can involve as many of the intelligences as possible because applying these intelligences gives the students accomplishments (González et al., 2016; S. N. M. Mohamad, 2014).

Chauhan et al. (2015) also applied adaptive learning that seeks to personalise learning. In the context of gamification, educators need to effectively use suitable game elements that can be applied in the teaching and learning process to cater different styles of learning. Gamified e-learning sites to support the multiple styles of learning would be developed to encourage learners and increase learning engagement. This study was designed as a continuation of a model for teaching tools based on interpersonal, visual, and verbal intelligences by Mohamad (S. N. M. Mohamad, 2014).

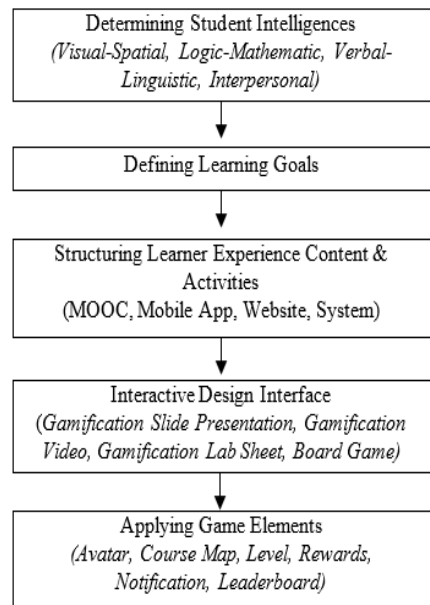


Figure 7 Gamification Approach in Education

Defining Learning Goals: It is important to define the learning goals in education; otherwise, all the game designs applied are meaningless.

Structuring Learner Experience (Content and Activities): In the adaptive learning concept, the adaptive design interface is based on student intelligence. Through adaptive learning, it will allow students to progress at their own pace, increase student engagement, improve student performance, as well as provide effective learning and better learning experience. However, it is hard to decide the required level of adaptability (Chauhan et al., 2015).

Applying Adaptive Game Design Interface: According to Darejeh and Salim (2016), the most popular game design interfaces are as follows: (i) leaderboard (46%); (ii) fantasy (14%); (iii) avatar; and (iv) knowledge map (5%).

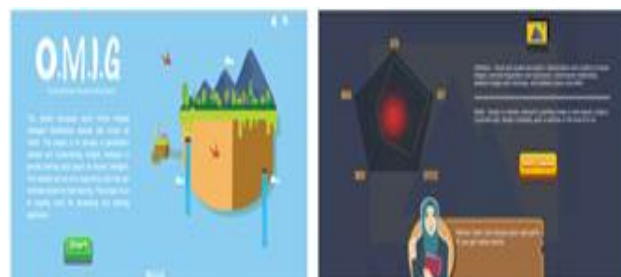


Figure 8 Gamified E-Learning Site Based on Students Intelligence

Applying Game Mechanics: The selection of game mechanics is based on the personalisation of the learner. If learners have strength in visual, the avatar and course map are created to be suitable to their learning. Based on Mohamad (S. N. M. Mohamad et al., 2014), game mechanics is a tool created by the gamification engine to lead players to achieve their objectives. Game elements that are applied in this study are Avatar, Course Map/ Progress Bar, Level, Badges/ Trophies/ Reward, and Challenge/ Mission as explained in Table 3.

Table 3 *Game Mechanics Used In this Study*

Mechanic	Synonyms	Description
Points	Measure, metric, currency	Numerical unit indicating progress based on progression. Users will receive a point when the mission is accomplished.
Rewards	Prizes or gifts	At the end of the lesson, the users will receive points that can be a form of physical prizes as a reward that students can enjoy.
Level	Area or stage	Travel from one level to another level.
Notification	Answering questions, messages, alerts	Acknowledgement of successfully executed actions.
Avatar	Icon	Virtual representations of the students, whereby they can choose their own mentor to interact with the system.
Progress Bar	Level up or levelling	Milestones that indicate progression.

RESULTS

Table 4 shows the demographic data of respondents. Figure 9 shows the analysis data about the gamification elements. Result shows that most of the respondents prefer to get reward during the learning process follow by level, avatar and points. 83.3% respondents agreed that they like to get rewards after completed the task given.

Table 4 *Demographic*

Variables	Category	Frequency	Percentage (%)
Gender	Male	10	33.3
	Female	20	66.7
Age	21-25	29	96.7
	26-30	0	0
	31-35	0	0
	36-40	1	3.3
	Education	Degree	30
Level of ICT competence	1	0	0
	2	1	3.3
	3	8	26.7
	4	17	56.7
	5	4	13.3

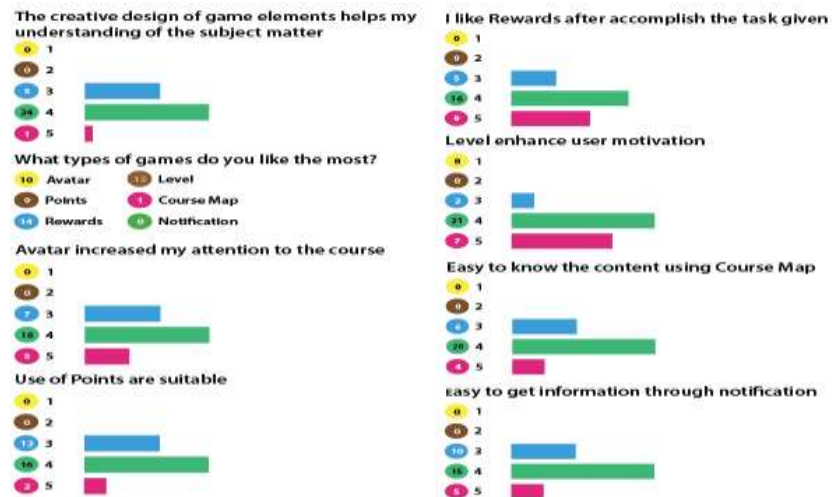


Figure 9 Gamification Elements

CONCLUSION AND IMPLICATIONS

This paper found that gamification can be integrated to all platforms and can help to engage student learning. Gamified e-learning sites to support multiple styles of learning would be developed to encourage learners and increase learning engagement. This study was designed as a continuation of a model for teaching tools based on interpersonal, visual, and verbal intelligences by Mohamad (S. N. M. Mohamad, 2014). Online Multiple Intelligence Gamification would be developed as an educational website using the gamification elements to make this website more interactive to users. Therefore, implementing gamification elements into the website would increase user motivation and enhance engagement during the learning process, besides allowing users to use the website for a longterm period.

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