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The Basics of Gamification: Case Study of FSTM Students

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Abstract. The trend of employing game features into non-game contexts or gamification has increased in recent years. Gamification has the potential to be a new paradigm in enhancing online user engagement in the education system. This paper discusses a number of issues relevant to gamification. The first section introduces gamification in terms of its motivation and challenges, the how and why gamification became the hype among gen Y or millennial learners with the use of Flow Theory. The first section is finalized with the discussion of the two building blocks of gamification; game mechanics and game dynamics. The second section discussed the case study done to investigate the students' perception along with their habits of online game usage. Finally, the paper concludes with a brief section that proposed the use of gamification as an education tool. This section also argues the need for further studies involving gamification before being implemented.

Keywords: Education; gamification; game mechanics; game dynamics.

INTRODUCTION

Before starting to formally define the term gamification, there is a need to define the root of it - the word 'game'. A game is denoted as a system in which players engage in an abstract challenges defined by rules, interactivity, and feedback and results in a quantifiable outcome and often elicits an emotional reaction [1]. According to [2], a game is (1) a rule-based formal system with (2) a variable and measurable outcome, where (3) different outcomes are assigned different values, (4) the player uses effort to influence the outcome, (5) the player feels attached to the outcome, and finally (6) the consequences of the activity are optional and negotiable.

In April 2016, an annual research report on the essential facts about the computer and video game industry was released by the Entertainment Software Association (ESA). The annual research was targeted on a population of more than 4,000 American households reported that the average game player age in America is 35. In addition, the report also pointed the 18-35 years age group as the biggest user of video game at 29%. This finding is closely trailed by the below 18 years of age group that makes up 27% of the overall game users. (Figure 1)

The same resonance could also be seen in Malaysia. The Newzoo's 2016 global game market report update forecast Malaysia to be among the top 20 countries segregated by game revenues. The 22.8 million online populations in Malaysia managed to secure 539.5 million of gaming revenues which surpasses Netherlands and Thailand. In the educational sector, a research by [3] on university students reported that all the respondents involved in their research were exposed to computer games, and mostly (36.8%) were introduced to computer games between the ages of 10 – 12 years. The research concluded by mentioning a correlation between early exposure and academic performance. Based on the stated interest among students and the benefits that games can offer to learning, it is worth studying how to implement gamification in the education system.

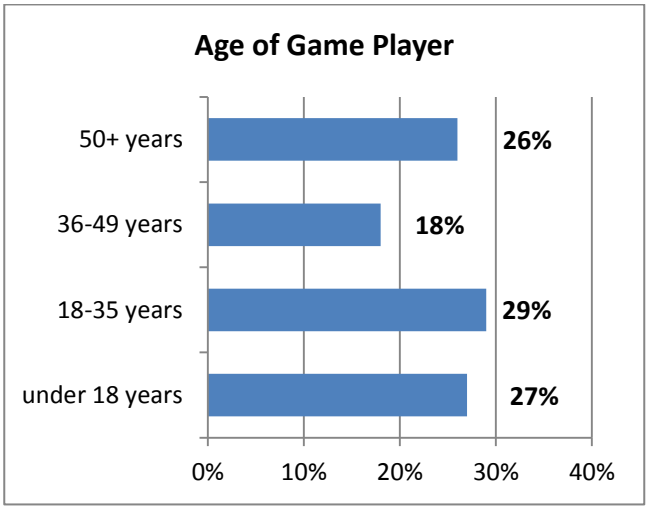


FIGURE 1. Age of Game Players

Motivation and Challenge

Gamification has the potential to positively motivate performance, productivity, and engagement of employees, users, or customers. For instance, Foursquare (http://www.foursquare.com) has successfully used gamification to drive their users' check-in process at their nearby locations. Another example is provided by DevHub that allows users to create their own blogs and web sites. According to [4], the introduction of gamification allows 80% of DevHub users to finish creating their sites compared to just 10% before implementing gamification in the prosess.

As with many other technologies, the main challenge to incorporating such technology mostly emerges through the lack of funding. According to [5], most institutions are primarily focused on operational, skills-based technology use rather than its meaning-making potential and role in the development of multimodal literacies. In addition, the introduction of one size fits all approach by vendors such as Bunchball and Badgeville may induce unsatisfactory results in terms of achieving the objectives to the specific gamified applications. In the end, these gamified applications fail to drive participation and sustain user engagement.

Integrating the Flow Theory

Ideally, in an educational game setting, players will learn how to solve complex problems. Usually the problems started off easy and then progressively become more difficult as the players' skills develop. The continuous scoring, immediate feedback, and the feeling of self- satisfaction while engaging with the games can help in upgrading individuals' self-esteem. This is specifically true especially for the gen Y or millennial generation who were born after 1980s that thrives on the constant online challenge.

The following paragraphs justify the reasoning for labelling the experience of flow as a spontaneous joy that happens when a person performs a task. In the book "Reality is Broken" by [6], the author explained that learning the structure of an activity and strengthening the required skills and abilities to experience flow normally requires a long time. However with video games, one can go from zero to flow in 30 seconds [6]. Therefore, as the gen Y or millennial (who grew up with numerous forms and designs of video games) enters higher education institutions and also assumes leadership positions in the workplace, the prior experiences will change the way these millennial perceive gamification in either the education system or business operations.

The flow theory conditions that activities which are in the balance between difficulty and skills could create a state of flow that is motivational [7] which in recent years has been applied to the behaviour in gaming activities by some research (such as [8]; [9]). Flow designates a state of complete absorption or engagement in an activity. A "flow activity" is one in which the mind becomes focused and engaged on an activity, rather than being distracted.

In Figure 2, the flow state can be represented as a "channel" on a plot of challenge versus skills. The flow channel separates the states of anxiety and boredom. It is a correlated quality. Therefore, if the challenge of a task decreases, it might become boring; if the challenge increases but one's skills do not improve to meet the challenge, then one might get into a state of anxiety. According to [10], a learning activity might produce a progression up the flow channel as new skills are learnt and greater challenges are required on which to exercise those skills.

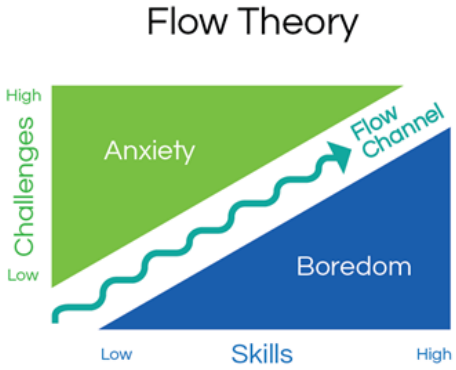


FIGURE 2. Csikszentmihalyi's original model of flow (adopted from [10])

Gamification as the Next Wave of Engagement

Technological innovation continues to expand and impact the education field. In addition, these innovations have directly and indirectly changed the design and delivery of teaching and learning process. This process resulted in the utilization of gamification and serious games for educational purposes [11]. Both the teaching practices and the ways of students acquire knowledge are affected. Thus, in order to be at par with the current technological innovations, higher learning institutions need to continuously figure out latest and innovative solutions to improve the current teaching and learning process [12].

In general, gamification is the approach the uses game features into non-game activities to motivate or influence users' behavior. Among the most popular expressions of this paradigm is the trend of 'gami- fication', which emerged in 2008 as a behavioural marketing strategy that makes use of surface level game features such as badges, achievements or rewards as an 'incentive' for consumer loyalty [13]. From the marketing contexts, gamification is used to create an engaging dynamic to build brand loyalty. Gamification is also the trading currency in some organizations used to encourage employees' interest in organizational efforts. Meanwhile, gamification in the educational environment normally uses elements such as points, badges, or progress bars to engage students in the learning process. This engagement is said to also increase students' motivation. The next paragraph will focus on the history and definition of gamification.

According to [14], the term gamification was coined in 2002 by Nick Pelling, a computer programmer and inventor. Gamification refers to the use of various elements from games in non-game contexts [15]. [15] also mentioned that gamification was first documented in 2008, however, extensive adoption only begins before the second half of 2010. A review by [16] declared that numerous authors ([15]; [14] ; [17]; [18]; [19]) considered gamification as an approach that uses game features (elements, mechanics, frameworks, aesthetics, thinking, metaphors) into non-game settings.

In order to better understand the concept of gamification, the first essential thing is to differentiate between serious games, gamification and game-based learning. One thing for certain is that all these terms are different from entertainment-oriented games [20]. This is because serious games, gamification and game-based learning are designed for a purpose other than entertainment [21] while entertainment-oriented games were specially designed for entertainment purposes. To elevate a mutual understanding, it is necessary to mention that serious game in this study reflects "a game in which education (in its various forms) is the primary goal, rather than entertainment (p.17)" [22]. The purpose for serious games varies from training, investigating, and advertising [23] to promoting a desired action such as knowledge sharing ([24]; [25]). From this standpoint, gamification and serious game is similar. In contrast, game-based learning uses an actual game to teach knowledge and skills - with a definitive start, game play and ending [26]. The following Table 1 indicates the distinction of serious games, gamification and game-based learning as mentioned in several references.

TABLE 1. General distinction of serious games, gamification and game-based learning (GBL)

	Serious games	Gamification	Game-based learning (GBL)
Basic Definiton	Games designed with objective other than entertainment [27].	The use of game elements in a non- game context [15].	Digital game-based learning (DGBL) is a competitive activity in which students are set educational goals intended to promote knowledge acquisition [28].
Purpose	Games that is designed to achieve some change in the player such as change in knowledge, attitude, physical ability, cognitive ability, health, or mental wellbeing [27].	Often used to drive motivation.	Not a game - this is an approach to learning that uses games to tech from start to end [26].
Reason to Use	the vast majority of these games are targeted at learning and education [23].	to engage users and motivate their activities and as a result promote learning [29].	to promote learning or the development of cognitive skills, or else take the form of simulations allowing learners to practice their skills in a virtual environment [28].
Focus	Emphasize on learning (Pedersen, 2009).	The content is usually distributed over time, and is not meant to be learned in one setting [26].	used as a one-time instructional event to provide formal learning either online or within a classroom [26].

The Building Blocks of Gamification

Understanding the building blocks of gamification will provide a clearer understanding to the contexts the gamification concept is most effective, and outline its limits. Thus, the following paragraphs will elaborate on the two basic building blocks in gamification; game mechanics and game dynamics.

Game mechanics and game dynamics are interrelated and used interchangeably. This study adopts the definition by [30] where game mechanics are the agents, objects, elements and their relationships in the game. In the book "Ten Ingredients of Great Games", authors [31] identified ten game mechanics elements: (1) Self representation with avatars; (2) three-dimensional environments; (3) narrative context; (4) feedback; (5) reputations, ranks, and levels; (6) marketplaces and economies; (7) competition under rules that are explicit and enforced; (8) teams; (9) parallel communication systems that can be easily configured; (10) time pressure. While, game dynamics is the result of the exciting and motivational nature of the experience in using game. Similarly, there are numerous game dynamics elements such as rewards, status, competition, self-expression, and others [32]. The following table shows a list of popular game mechanics elements and with their descriptions. These elements are typically used in combination.

TABLE 2 Popular Game Mechanics Elements
(Adapted from [33])

Game Mechanics	Description
Points	Users can earn different types of points by participation and performance.
Levels & Status	Level typically shows progress in the game. Level may be indicated by a numeric value or a user's status such as "novice" or "expert.
Quests & Challenges	Quests and challenges guide users to perform pre-defined tasks. They help inexperienced users to learn how to move forward.
Badges & Achievements	Users can collect badges that visually indicate their achievements as they accomplish specific tasks and missions.
Leaderboards	A leader board enables users to compare their own performance with others and stimulates competition
Progression	A visual tool that displays the advancement of users and the remaining work to reach a goal. It motivates users to accomplish a pre-determined goal.

Which of the mentioned game elements and game dynamics should be applied in the education system? Although researchers have tried to break the games into components, but consensus has yet to be achieved. However, there are certain dynamics and concepts found in the game design which are more consistently successful than others, when applied to learning environments [34] such as freedom to fail, rapid feedback, progression, rewards and storytelling.

Games give learners the freedom to fail. Learners can safely do something wrong and then restart with minimal concerns and almost no negative implications. It allows authentic learning experience because we learn more and are motivated more by a failure than success. This scenario is in contrast to the current learning environment where according to [29] do not encourage exploration or trial-and-error learning. The consequences are learners have little insight into the real consequences and do not get the chance for multiple repetitions that could improve mastery. Towards this game shows a promising prospect.

Game should be usable and provide clear goals and appropriate feedback to the player in order to facilitate flow experience. The reflective observation of the feedback may lead to the construction of mental diagrams which help in the discovery of new and better solutions to the problems. Therefore, it is vital to confirm that feedback loops have a reasonable response time delay before they kick in, in order to keep the game fun and engaging.

Progression is projected in games design in the form of levels or missions [34]. Levels allow a game to be divided into small, separate, attainable pieces and moving up to the next level is often provides strong motivation. It provides the freedom for learners to fail and try again [34]. In addition, progression can also be linked to the game dynamics of "the interest curve" [29] and "just in time teaching" [35].

Most games design focus on adding points, levels, leaderboards, achievements, or badges to a real-world setting to attract learners to participate with the real world to earn these rewards. Currently, gamification design mechanics of rewards includes tangible rewards (such as points or virtual currency) and intangible rewards (such as praise or

recognition from others) [36]. In the book, "A RECIPE for Meaningful Gamification", [37] mentioned the importance of reward to sustain the desirable behaviour in achieving short-term goal. However, the author warns that reward must be used cautiously to obtain long-term goals [37]. Therefore, rewards must be designed in such a way that the reward is meaningful and lead towards engagement.

Another aspect of game design that can positively impact learning is the narrative or story. As [29] notes, most games employ some type of story. [38] argues that narration and storytelling are two of the most powerful instructional strategies. As [39] points out "stories allow us to learn from the experience of others without having to face another person's personal consequences". Providing a unifying story throughout a curriculum can put the learning elements into a realistic context in which actions and tasks can be practiced, something that is considered extremely effective in increasing student engagement and motivation [29].

THE STUDY

Purpose of the Study and Research Questions

The purpose of this study was to investigate the students' perception along with their habits of online game usage. The following research questions guided the preliminary study:

1. Do you play computer/video games, and who introduced you to computer/video games?
2. When did you start playing computer/video games, and how often do you play computer/video games?

Methodology - Sample

Being an exploratory study in nature, 124 respondents of final year students in KUIS were surveyed regarding their opinions regarding their prior/current exposure to computer/video games. The final year students were selected because they have completed their at least 60 credit hours of learning therefore they have the experience in giving opinions on their prior/current exposure to computer/video games.

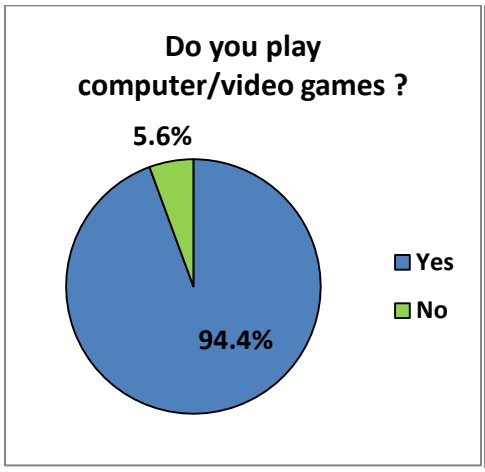
Methodology - Research Instruments

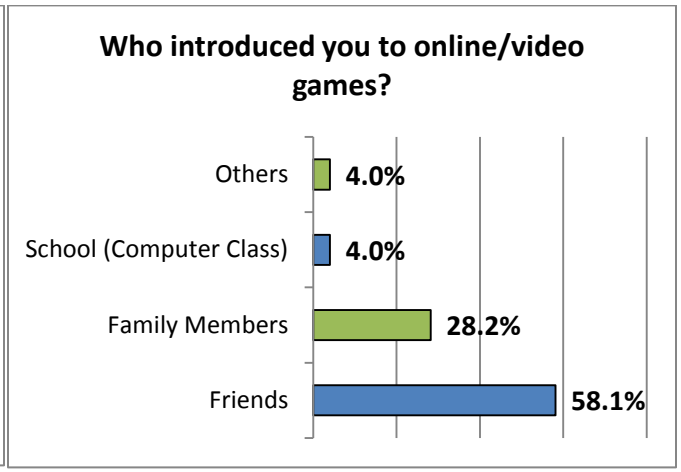
A survey instrument was adapted from [3]. The designed survey contained a 5- point Likert-type questionnaire that ranges from 'strongly agree' to 'strongly disagree'. The adapted survey had four parts altogether, but for the purpose of this paper, only part A (demographic) and part B (exposure and habit) is discussed.

Results and Discussion

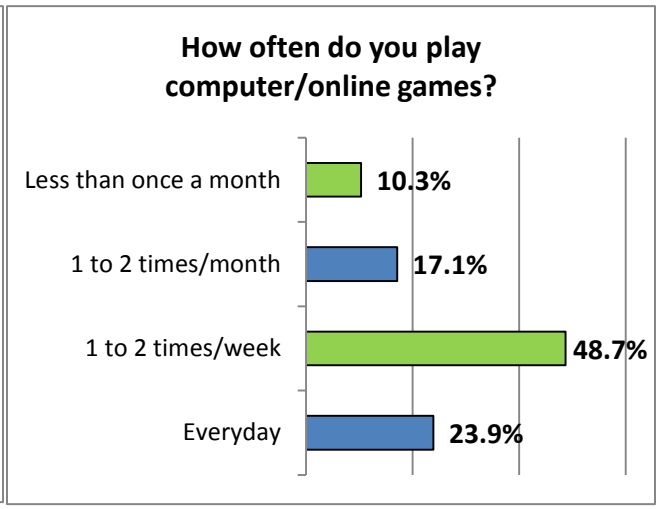
The result for the first research question, "Do you play computer/video games, and who introduced you to computer/video games?" were shown in the following pie chart and bar chart. It indicates that a majority of the students (117 students) involved in the study have experienced in playing either computer or video games. The students were mostly introduced to the computer/video games by friends (58.1%) followed by family

members at 28.2%. Both school activities and others only gained 4%. Popular responses mentioned by respondents as introducers were media/Internet/Google.





The result for the second research question, "When did you start playing computer/video games, and how often do you play computer/video games?" were visible in the following pie chart and bar chart. In line with the annual report by the Entertainment Software Association (ESA), 51.8% of the respondents were exposed to computer/video games before the age of 11 years old. While the rest (48.2%), were exposed between the ages of 11 to 21. This finding evidently proved the fact that gen Y or millennial learners were exposed to computer/video games at early ages. The following bar chart was used to indicate the habits of the gen Y or millennial learners in terms of playing the computer/video games. A majority (48.7%) of the respondents played one to two times a week.



CONCLUSION

The appeal of computer/video games among the younger generation has sparked interests among scholars to study on how gamification can be used in educational setting. However, since this gamification is relatively a new field in education, not many

educators or educational institutions have implemented it. Furthermore, gamification is also being intertwined with other types of computer/video games such as serious games and game-based learning (GBL). Therefore, this study intends to add more knowledge and evidence in this field through the findings of this preliminary case study. The reasoning goes, if the current generation of learners spend a great deal of time playing computer/video games then why shouldn't educators or educational institutions harness that same kind of motivation to engage them in the classroom. Thus, the study serve as an initial indicator that gamification is indeed the next wave of engagement.

In addition, gamification is also a field that builds on the success of the gaming industry, social media and decades of research on human psychology [40]. Hence, the findings of the case study indicate that gen Y or millennial learners in Malaysia have been exposed to computer/video games from early age and have acquired the habit of playing the computer/video games weekly in order to be in line with their peers. However, as with other technological innovations, gamification is not without challenges. Some studies suggested that student engagement is superficial and is better suited for lower level learning outcomes [41], which eventually calls for further studies. Hopefully, this on-going study will help provide some insight into gamification design and effectiveness especially for the local education setting.

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