

Gamification and Education: An Overview

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Abstract

Gamification is a genre of social interaction that concerns those in fields like academia, as well as professionals of business, education, and information technology. However, as a term, it remains hindered as of varied uses and meanings, it has been divided according to its educational usability. It has been dealt with in terms of merits and demerits to validate its usefulness by offering the proof to encourage those specialized in education as well as entertainment. In this paper, a general overview of gamification and in education respectively (i.e. learning and teaching) with a glimpse from empirical studies. Followed by an examining of its contributions for a better improvement in the educational process in general. This articles gives a general description overview on the use of gamification in understanding its applicable usefulness in the field of education due to its feature of edutainment. It outlines gamification in both theory and action, with an emphasis on empirical side in relation with context and purpose and context. Furthermore, it shows that gamification as a conceptualized concept is emerging in the field of education to meet the expected outcomes. A discussion on the probability of the way gamification to be more useful as a subdivision to improve the systems of interaction of user experience by using gamified design. The paper concludes with suggestions of nonstop investigations of gamified applications and its effectiveness.

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I. INTRODUCTION

In the field of education, attention has been directed towards gamification in recent years. It is looked at as a manner for increasing the way students are engaged, motivated, attended and academically performed. Meanwhile, on the level of gamification, experimental studies within the field of higher education show the uncertain outcomes in some areas. The data of uncertainty is difficult to be interpreted due to the multiple ways in which gamification can be designed and implemented. Gamification seems to be taken a broad view with the tendency to be depended on extrinsic motivation. (Zichermann & Cunningham, 2011) have said that gamification is the way game mechanics in a non-gaming context is applied. Such mechanisms are

quests, levels, badges, points, leaderboards, virtual goods, avatars, narratives, and progress bars. These are to be used in an isolatable or in various combinations. Gamification also has varied forms that are drawn on design principles, and among them are, allowing the students on trial and error principle without penalty. In addition to, free choice of different activities that are appropriate to the students' interests. The increased attention towards analytics in learning (Dietz-Uhler & Hurn, 2013) ; Dyckhoff, Zielke, Bültmann, Chatti, & Schroeder, 2012) and the production of data learning management systems (LMS) has added to potentiality of gamification as a manner in the production of this data for the purpose of appraising instructional design and the improvement of

students' performance. In varied domains such as education, business, IoT, health-care, etc. gamification is considered to a great extent. This process represents the usage of game elements in contexts which are non-game ones. Even sometimes it is called the phenomenon used to create gameful experiences.

II. GAMIFICATION AND ITS INFLUENCING FACTORS

Age and Gender

During a survey in 2017, it has been shown that the representation of people of above 18 years of age is 72% with an average age of 35 years. (Wright et al., 2001) have said that children who play video games tends to be higher for boys gamers more than girls. For a week, ages such as 13 – 14 years of both genders are playing an average of seventeen hours. However, videos games that have physical action and sports are the kinds of games preferred by male gamers. While the more traditional, thoughtful classic board games and puzzles are the preference female gamers (Greenberg et al., 2010).

Behavior Characteristics

Within games, the chance to increase the individuals' ability to behave in such a way that reflects their ideal-self. This in turn, increases the experience while having pleasure. (Przybylski et al., 2012). Girls are more inclined to select first person shooter as a positive self-regard, which is linked to likelihood in terms of preferred game, whereas boys tend to choose difficult ones as Massively Multiplayer Online Role Playing Games (MMORPGs) (Homer et al., 2012).

Parental Intervention

As a common sense, home is regarded as the point in which access for internet is available for children, which causes insufficiency of familial spent time. This in turn, however, is not affecting communications among family members. (Lee and Chae, 2007).

Here, parental intervention works only due to negative behavioral are effecting adolescents' behaviors. In the case, parents expect the effect to be on positive social-emotional outcome, the parents' role takes the type of children's co-playing (Nikken and Jansz, 2006). Moreover, there is an association between co-playing video games and lowering in internalized and behavior og aggression. (Coyne et al., 2011).

Video Games and Depiction of Characters' within a Game

The growth of a single game has been from the mode of a single player to a network of gamers as for group games as a shared experience (Oliveira and Henderson, 2003). Genders differ in the way are characterized in video games. This means that, the depiction of female characters is shown to be a hyper-sexualized and passive, whereas the character of a male as depicted to take the strong action of aggression. (Burgess et al., 2007).

III. THEORIES RELATED TO EXCESSIVE BEHAVIOR IN GAMING

Gratification Theory

As reacted to old-fashioned mass communication, the 1940s witnessed the emergence of this theory. This theory assumes that people actively choose one choice from amongst the diverse media, in touch with their current need (Wu et al., 2010).

Self-Determination Theory

Both intrinsic and extrinsic factors are considered in this theory that have either the ability or inability to motivate them. The occurrence of intrinsic motivation takes place in gaming, when the controls of the game are intuitive and their mastering continues with optimal challenging with chances to provide encouraging feedback (Ryan et al., 2006).

Gamification in Theory

With sectors of marketing and business, gamification has emerged as a trend and has

attracted the attention of practitioners from varied domains such as academics and educators. Moreover, gamification is not a new by itself, as rooted in marketing endeavors, such as point's cards and rewards memberships, educational structures, most notably scholastic levels, degrees and workplace productivity (**Nelson, 2012**). A number of converging factors are thought to have been the reason behind the rise of gamification. Such factors are cheaper technology, personal data tracking, eminent successes, and the prevalence of the game medium (**Deterding, 2012**).

The Way of Conceptualizing "Gamification" and "Games"

Gamification as contrasted to games might be taken in an easy way to define than it is to conceptualize. However, sources are in agreement that gamification can be referred to as the way to use game elements and mechanics in non-game contexts. While taking a profounder look into gamification for practice as theoretical foundations, purposes, and standards, in which further development is demanded. The two influential efforts carried out by **Deterding et al. (2011)**, in which they sought to conceptualize gamification in the light of the work of industry practitioners, academics and others. It has been found that a web of interconnected concepts in interaction of human computer and beyond: the concept of fun ware (**Azadegan and Riedel, 2012**).

While games are promptly recognizable as they are not difficult to be defined. Games are referred to by **Huizinga (2000)** as non-serious but strongly involving activities of voluntary that are designed by rules of boundaries and secretive society. **Avedon and Sutton-Smith (1971)** said that games are the activities that are confined by rules. The struggle between different teams is the characteristic feature of games, which usually ends with unequal results. While **Crawford (1984)** said that games need to be representatives of the system and the user's reality and interaction, with the conflict in a form of simulation. **Salen and Zimmerman (2004)** defined

games in terms of "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (p. 80). While the six main features: rules; variable; quantifiable outcomes; value-laden outcomes; player effort; player investment; and negotiable consequences are proposed by **Juul (2003)** with regard to effects of real life.

As proposed by **Deterding et al. (2011)** that the involvement of applying gamification elements of "gamefulness, gameful interaction, and gameful design" with a specific intention in mind (p.10). At this point, live experience is represented by gamefulness, the objects represent gameful interaction, tools and contexts that leads to the gamefulness to be experienced.

Terminology

As a system, a game usually has elements, which interconnect and can have similarity. For example, ranks gained by experience points are referred to as "levels" and "levelling", as in traditional role-playing games. However, these can be referred to stages in a game. Progression is the key factor in both cases that differs in connection to what it is applied: the person or environment. The explanation of such terms is as follows:

Term	Definition	Alternatives
Points	Numerical units indicating progress.	Experience points; score.
Badges	Visual icons signifying achievements.	Trophies
Leaderboards	Display of ranks for comparison	Rankings, scoreboard.
Progression	Milestones indicating progress	Levelling, level up.

Status	Textual monikers indicating progress	Title, ranks.
Levels	Increasingly difficult environments.	Stage, area, world.
Rewards	Tangible, desirable items	Incentives, prizes, gifts.
Roles	Role-playing elements of character	Class, character.

Games Usage

General Health

The coming of new technologies, games' types have varied according to the purpose it is planned for though entertainment. Such examples are food related (example- Fruit Ninja and Diner Dash) or physically active (example-Xbox Dance Central and Xbox Kinetic Sports) that is referred to the skills of cognition and coping. According to (Folkvord et al., 2013)advergAMES that support food, is used as a way to assist in increasing the energy intake of children. While in an enthusiastic way and by both genders, Kinect play is played as a way in increasing the action in reasonable levels (Verhoeven et al., 2015). The effectiveness of Exergames appear in assisting the adolescents to be moderate in levels of dynamicity of physical activity (O'Loughlin et al., 2012). It is also used as a way to ameliorate the mental health amongst the elderly (Li et al., 2016). Survivors of cancer are striving with community based games to be coped with (Comello et al., 2016). Games designed to train users' attention have intended effects on selective attention with the probability to assist in decreasing the concentration on tinnitus (Wise et al., 2016).

Social Life

Hussain and Griffiths (2008) have mentioned that massively multiplayer online game (MMOG) gamers can be active socially as other gamers' engagement in an interactive way with other gamers in the game. Moreover, the role of making new relationships among gamers rely on online gaming due to the connections resulted from playing the game. In addition, such connections are sustained as gamers be in contact even when they are offline (Trepte et al., 2012).

What Is Gamification?

Kapp (2012) said that game is "a system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback, that results in a quantifiable outcome often eliciting an emotional reaction" (p. 23). Consequently, the definition of gamification by scholars is as a way of using gaming principles (i.e., challenges, feedback, and interactivity) in nongame contexts (Attali&Arieli-Attali, 2014). Nevertheless, there is no link between play and fun from one side and learning, which is said to be as ineffective tool of teaching (Bogost, 2008). A rise has been seen by educators on the level of K-12 as introducing gamification in terms of engagement and knowledge retention (Bruder, 2015).

The Theory behind Gamification

Specialists of gaming assume that self-determination theory is the one that assists using gamification education. This is so, due to self-determination theory is in connection with motivation, with three key elements, such as autonomy, competence, and relatedness (Werbach and Hunter, 2012). (Ryan &Deci, 2000) have given the definition for motivation as being moved to do something. Therefore, if someone is not moving forward is described as unmotivated. On one hand, when someone is acting for the sake of gaining an outcome, he /she can be said as being extrinsically motivated. On the other, someone is acting for entertainment, is said to be intrinsically motivated

Extrinsic Motivation

A teach-stop-test cycle is used as traditional teaching styles aiming to help the learner to retain the content for the sake of passing the test (Shute & Ventura, 2013). However, the information learned, would be missed by the learner. The reason behind that according to experts in extrinsic motivation as the motivation is set for the learner for passing only (Werbach & Hunter, 2012). This in turn, in health care, can have the comparison with the traditional mandatory education staff is required to have for the goals of accountability. As staff are working only to finish the assignment, then educators can see how this could be perceived as ineffectively reliable.

Intrinsic Motivation

The emphasis of gamification is to meet the intrinsic needs of learners as it offers instant feedback and provide control over the material (Kapp, 2012). It has been shown by research that quality and experience are varied depending on whether the person is motivated either in an intrinsic or extrinsic manner (Ryan & Deci, 2000). Therefore, learners are looking for participation, knowledge improvement, learning and development (Cook, 2013).

Benefits of Gamification on Education

As a tool of education, advantages of using computer games start to be realized, though there have been many with skepticism (Can and Cagiltay, 2006). In education, games help in learning as they offer clear and concise instructions with goals that can be achieved, based the abilities of each individual (Hamari et al., 2016) due to their having attractive animation and graphics. Practical assignments are the evidence of students' achievements after having spent time on educational games. However, this is not the issue with written assignments in which classroom activity participation was required. This case is the same even with their high motivation at the initial stages of teaching (Domínguez et al., 2013).

The Reason Gamification Works in Education

Learning by doing is the chief task of gamification, which helps in improving both processes and outcomes (Shute & Ventura, 2013). With gamification, learners are given the opportunity to learn on their personal time and way. These learners are also allowed to follow their progress, providing autonomous learning (Klopfer et al., 2009). During participation, there is the opportunity of failure while experiencing the game. Learners can encounter emotions like frustration, wonder, mystery, and amusement while experimenting (Lazzaro, 2004).

IV. LITERATURE REVIEW OF GAMIFICATION

Meaningful Gamification

Approaches of gamification meet at one point, which focuses on giving feedback to players, students as well as users. This is helpful as it gives them the chance to know their performance. Yet, this feedback needs to be meaningful (i.e. students should be assisted to know their progress in the class). As suggested by Nicholson (2015), reward-based gamification, which includes using badges and points to reward good behavior, has limited, short-term effectiveness. Every learner will not have the same benefit from any given approach to gamification and that students should be given the chance to select the way they demonstrate depending on their own capabilities and understanding of what they have learned (Nicholson, 2015). A recipe for meaningful gamification, which is given by Nicholson that produces theories of learning set by other scholars in the field of gamification into six elements: play, exposition, choice, information, engagement, and reflection. "Play" is meant to make students as explorers, try and fail freely. This element has flexibility since it relies on the learner's interest to move on. "Exposition" means to give learners the better way to concert the narrative layer with the course of the students' world.

“Choice” refers to the controllability of students over what they want to learn and it is a main factor to self-determination theory. Choice also participates on how they want to learn, and what they want to complete. The importance of choice comes as it makes students autonomous over their environment.

“Information” refers to the connection between the rationality behind the gamified course, and not the number of points that can be achieved during a play. The focus on the rationality makes the movement of this approach out of behaviorism, where the concentration is on reward.

“Engagement” is the way students are engaged among each other and with other gamified mechanics as well. In online courses, social engagement, can be managed by the use of leaderboards or profiles of students. However, these should not be imposed on the student and the gamified system has to have the ability to provide increased levels of difficulty so that it decreases the boredom.

Finally, within “reflection” students are allowed to think about their learning experiences, connect these experiences with their lives, and share these insights with their peers.

Gamification Mechanics

Game mechanics are the steps/stages/strategies found within a specific game, which are used through the playing of that game. These mechanisms include badges, points, challenges, rewards, leaderboards, and levels (**Hamari, Koivisto, & Sarsa, 2014**). These mechanics are also used by students in problem solving way as a fun way at the same time (**Bruder, 2015**). An increase of retention rate is by using game mechanics and such increase is concerned with information up to 10 times, which is higher than that resulting ones out of a lecture (**Cook, 2013**). These mechanics need to be combined with achievable goals, rules, voluntary participation, and feedback to work (**McGonigal,**

2011). Gamification four mechanics are described as follows:

Points

The use of points can be carried out in many ways to achieve the goal of learning is more engaging. By applying points, instant feedback is provided, which can be presented in an external manner to show others how well/unwell a user does (**Werbach & Hunter, 2012; Zepeda, 2014**). Points also show the user’s progress and provide data to the educator to specify the way the learner understands the material.

Badges

An indicator in a badge for a single user, which indicates a visual cue as he/she has achieved (**Bruder, 2015**). For instance, many exercise programs give exercisers badges when they finish 10,000 steps. Flexibility is the characteristic feature of badges and any activity can have badges. In addition, a social factor can be provided by badges and can be used in an expressive way on social media platforms.

Leveling Up

To check one’s progress within a game, levels are used by gamers to know the way they are progressing within the content (**Bruder, 2015**). Levels/leveling are used by educators to demand the advancement of learners by achieving points, or collecting things. Leveling up is used when the educator attempts to show the difference between certain groups.

Leaderboards

The number of people playing a games is shown by leaderboards and the way the gamer is doing. Sometimes, only top players are shown by leaderboards. A bit of competition is provided by such mechanics and can be used to motivate learners in a fun way so that they will be able to continue learning the content.

Gamification in Action

Gamification is a multifaceted disciplinary tool with varied domains, theories, methodologies, and reasons for implementation. Across disciplines, the empirical work has started the exploration on the way to use gamification in related contexts. On gamification in action, the existing literature as for the gamification implemented into systems with human subjects. Gamification in action as a process, takes three main streams, which are the purpose for using gamification, gamification techniques in use and the consequences resulted from humans' participations in research.

Benefits of Gaming in Nursing Education

Gamification has the capability of filling that emptiness as the learner has the ability to achieve access through multiple scenes (i.e. computers, tablets, or smartphones) and this is because simulation has become plentifully essential in teaching nursing skills to students. Learners who are used to use computers, tablets, and smartphones as a means for communication and collecting information both at work and at home. Here, gamification takes the advantage by assuming that a learner will be intrinsically motivated to learn as he / she is offered the flexibility do so at his / her own pace.

In addition, a safe environment for failure is provided by gaming. This means that, a player can go into an unsafe environment (e.g., a code) and apply what has been learned without causing harm to the patient. In case of the patient's death, the learner can restart with an increased knowledge of what is allowed and what is not. As the learner is able to use trial and error without causing danger to a patient or unacceptable grade to be received for students to explore the best way to use critical thinking (Bruder, 2015).

V. CONCLUSION

A spot light has been put on the some critiques against gamification as well as with a defense on its role as a tool for advancement in instructional

design through meaningful gamification. The same is with any other tool of education, gamification, is not either good or bad in terms of intrinsic motivation. The reliance is mainly on the way it is designed and implemented. Within gamification, many principles are found which allow better instructional tool to be used in an online teaching due to the availability of platforms that are used to enhance it directly. Google sheets, as other tools, which can be made suitable to meet the intended goal. For future studies, an involvement of instructors on gamification should be from varied disciplines to see how other learners/students are influenced and if specific designs can work in a better way than others for different disciplines.

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