International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 6 Issue 7, November-December 2022 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Gamification in Education: An Overview

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ABSTRACT

Gamification is the use of game-based elements (such as point scoring, implementation of goals, and competition) and game principals in non-game contexts. It is the application of elements of video games, game-thinking, and game-mechanics to help solve everyday real-life problems. It has emerged as a promising area of imparting education. It transforms students from passive participants to active ones. It assumes that students learn best when they are also having fun. The goal of gamification is to maximize teaching and engagement by capturing student interest and inspiring them to continue learning. This paper provides an overview on gamification in education and its applications.

KEYWORDS: *games, gamification, education, learning*

How to cite this paper: Matthew N. O. Sadiku | Uwakwe C. Chukwu | Abayomi Ajayi-Majebi | Sarhan M. Musa "Gamification in Education: An Overview" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-6 | Issue-7, December 2022, pp.738-744, URL: www.ijtsrd.com/papers/ijtsrd52425.pdf

IJTSRD52425

INTRODUCTION

Technology permeates a lot of our day-to-day lives. It has changed the way we live, shop, work, play, eat, connect, meet people, and socialize. Rapid advances in digital technologies are constantly unveiling new ways for us to interact with the world. Due to these technologies, the education industry has undergone major transformation. One of the trends sweeping the industry is gamification.

Games are widely popular and entertaining. The games industry is one of the most lucrative industries due to the billion dollar sales of digital games. The global game marketplace includes video game console hardware and software and online, mobile, and PC games. Games are designed systematically, thoughtfully, and artistically for the purpose of creating fun and enjoyment. Although games and gamification have a lot in common, they are not exactly the same [1,2]. Gamification is the process of applying the science and psychology of digital gaming (such video game elements) in a non-game environment. It is the craft of deriving all the fun in games and applying them to productive activities. It involves taking something that already exists and integrating game mechanics into it to motivate participation and increase engagement [3]. For example, it is being employed to enhance user engagement by adding playfulness and fun to existing information systems.

WHAT IS GAMIFICATION?

The word "gamification" was coined in 2002 by Nick Pelling, a British inventor, but it did not gain popularity until 2010. The idea of gamification came from the fact that the gaming industry was the first to master human-focused design and we are now learning from games. Gamification is not a new concept, but it is deeply rooted in marketing endeavors, such as points cards, grades, and degrees, and workplace productivity [4]. Researchers became interested in gamification because the concept could be implemented in different ways to motivate people. Gamification has become hugely popular in all walks of life, including education. The concept of gamification is illustrated in Figure 1 [5].

Everyone loves games. Gamification in education is the process of transforming typical academic components into gaming themes. Education is perhaps the most successful and well-known area of application for gamification. Traditional education has been found to be ineffective in motivating and engaging many students. Gamification in education is a viable alternative to some of the existing educational delivery methods. It is fast emerging as an effective technique to motivate and engage learners. It facilitates better learning experience and environment, increases recall and retention, provides instant feedback, engages and entertains learners, and drives strong behavioral change [6]. The goal of education gamification is not to replace regular lectures but to be a supplemental tool for students in learning concepts. Gamification simply means improving the learning that occurs in an experience. It unifies educators and engages learners through an effective, systematic approach [7]. It inherently promises is to provide student with learning at comparably low cost. It has a positive effect of making difficult subjects (such as engineering) more manageable, increase intrinsic motivation, scientific knowledge, and collaboration [8].

Games have some distinctive features which play a key role in gamification [9]:

- *users* are all participants – employees or clients (for companies), students (for educational institutions);
- *challenges/tasks* that users perform and progress towards defined objectives;
- *points* that are accumulated as a result of executing tasks;
- *levels* which users pass depending on the points;
- *badges* which serve as rewards for completing actions;
- *ranking of users* according to their achievements.

The gamification can be viewed in two ways: (1) adopting the act of playing a video game into everyday use, (2) the act of using game elements to make non-games more enjoyable. It is applied in education, business, sports, marketing, and finance. It is currently one of the largest trends in education. Traditional education has been found to be ineffective in motivating and engaging many students. Gamification is cutting-edge approach which is producing positive results in every region of the world

COMPONENTS OF GAMIFICATION

Gamification is a multidisciplinary technique covering a wide range of domains including game study, human-computer interaction, and psychology. Looking at the components (or core drives) of gamification will help us understand what a gamified system actually consists of [10]:

- *Games*: Figure 2 shows various uses of games. Digital games involve programming computers to play games. They have become the fastest growing section of the entertainment industry. The educators, military, government, and health-care providers use digital games. Games used for serious purposes or "serious games" are used by the military.
- *Gamification Elements*: These include [11]:

A. Awards: A particular award is given to the player on the completion of a behavior.

B. Point-based reward system: The players obtain a reward in the form of points on the completion of a certain behavior.

C. Badges: These represent certain achievements of the user/player. They are common extrinsic rewards employed in gamification efforts.

D. Levels: The users have a level that increases as they reach a certain number of points.

E. Quests: The tasks the player has to complete are presented as a quest.

F. Voting: Players can vote on another player's behavior.

G. Ranking: A ranking with the top players is presented to all players to increase competitiveness.

H. Betting: Players/users bet on a certain event, such as an estimation, for example. The winner of the bet is rewarded.

- *Game Mechanics:* Gamification model are based on games mechanics such as rewarding system, customization, and leader-boards. The game mechanics represent the modes of interacting with games. These consist of rules, roles, and stories [12]. Figure 3 shows a list of game mechanics [13].

Fun is the secret ingredient that makes the gamification a truly unique experience. It is a consequence of brain adaptation to pattern recognition. Like games, gamification includes goals, challenges, competition, and collaboration.

APPLICATIONS

Gamification is the application of elements of video games, game-thinking, and game-mechanics to help solve everyday real-life problems. It is an umbrella term for using video game elements in non-gaming platforms with the goal of improving user experience and engagement. It can be used almost everywhere

using smartphones, tablets, and computers. It has been widely applied in different areas such as education, business, marketing, workplace, healthcare, edutainment, information studies, human–computer interaction, financial services, transportation, engineering, computer science, manufacturing, medicine, cybersecurity, and military [14]. We consider some of these applications.

- *Gamification of Learning:* Education is essentially about learning new things and enhancing capabilities. Gamification and game-based learning are both used in modern learning environments to engage students. Games have some elements that make them powerful tools for human learning. Gamification is the introduction of game elements into a traditionally non-game situation. The classroom is for learning and developing innate skills. The gamification of learning is an educational approach that seeks to motivate students by using video game design and game elements in learning environments. When a classroom incorporates the use of some of these elements, that environment can be considered "gamified." Without adding extra gaming elements to the classroom, schooling already contains some elements which are analogous to games [15]. For teachers, gamification requires rethinking the classroom. Figure 4 shows children participating in gamification in the classroom [16].

Examples of gamification in the classroom include the following [17]:

- Giving points for meeting academic objectives
- Giving points for meeting procedural/non-academic objectives
- Creating playful barriers
- Creating competition within the classroom
- Comparing and reflecting on performance in nuanced ways personalized for each student
- Creating a range of unique rewards desirable for a range of unique students
- Using levels, checkpoints, and other methods of "progression"
- Creating challenges with more than one way to be solved and emphasize the different approaches.
- Giving learning badges instead of (or in addition to) points or grades.
- Letting students set their own goals, then track their own progress in a
- Create problems or challenges with more than one way to solve

- *Elementary School Education:* Gamification is popular and appropriate in K–12 schools because it engages students by meeting them where they are. In K-12 education, gamification is about transforming the classroom environment and regular activities into a game. It requires creativity, collaboration, and play. Many children play video games regularly. Scavenger hunts, bingo, dice games, Connect Four and Scrabble have been around for decades and can be adapted for classroom learning. Children love playing. As the Girl Scouts and Boy Scouts recognize mastery and achievement with badges, teachers may reward student accomplishments and mastery with badges [18].

- *Higher Education:* Colleges and universities are using game mechanics more than K-12, elementary, middle, and high schools. Gamification is fast emerging as an effective technique to motivate and engage learners. It facilitates better learning experience and environment, increases recall and retention, provides instant feedback, engages and entertains learners, and drives strong behavioral change. The goal of education gamification is not to replace regular lectures but to be a supplemental tool for students in learning concepts. Gamification simply means improving the learning that occurs in an experience. It unifies educators and engages learners through an effective, systematic approach. The entire higher education system needs to be changed and should be made more innovative and engaging. Gamification is useful in higher education in the following ways:
  - Self-paced online learning could be more engaging.
  - Gamification motivates students to use their smartphones or devices in the classroom to learn their lesson easily with more fun.
  - College students are highly interested in playing games. They would be excited to complete a task and to compete with their fellow mates.
  - Some of the games are based on strategizing, which helps in boosting the thinking capabilities and problem-solving skills.
  - In gamification, students can be grouped for a certain task. It would help students to learn and do a task in collaboration.

- *Medical Education:* It is well known that technology continues to shape the healthcare industry, providing new avenues for the delivery of patient care.

Gamification techniques are increasingly been used to provide new channels for instruction and professional development among doctors, nurses and other clinicians. They have the ability to make learning fun, memorable, and more effective. Medical students should cease seeing their education as a challenge to overcome. They should learn seeing it as a game that can be won. Gamification in medical education is a viable alternative to some of the existing educational delivery methods. Physicians are having success with using online video games as their primary learning tool [19,20]. Over the years, medical education games, mobile applications, and virtual patient simulations for medical education have been developed. Gamification can act a catalyst for collaborative learning, where teams of learners can work together towards a shared goal. Whether medical schools incorporate gamification in their curriculum remains to be seen. The concept of "serious games" was introduced by Abt in 1970; they are games that have an explicit and carefully thought-out educational purpose [21,22]. The main reason for using games in medicine is their ability to motivate [23].

BENEFITS

Gamification describes the process of applying typical game-like components to non-game activities in order to keep people motivated and participating in the task at hand. It makes us derive fun from work and everyday activities more. Its objective is to first understand what drives people to play games (the feeling of accomplishment, competition, excitement, or pleasure) and apply these factors to your platform. Teachers and parents can implement gamification in various ways across countless subject disciplines.

Other benefits of gamification include the following [24]:

- Gamification makes learning visible
- Gamification increases motivation
- Gamification assists cognitive development
- Gamification can make learning a personal experience
- Gamification boosts engagement
- Gamification aids in cognitive development
- Gamification increases competition which can lead to engagement.
- Gamification involves creativity and student choice, which increases engagement.
- Gamification gives students immediate feedback and allows them to easily track their progress towards academic goals.
- Gamification provides instant feedback and reinforcement.

CHALLENGES

Some educators criticize gamification for taking a less than serious approach to education. Teachers who criticize the gamification of learning may fear that the curriculum might not be covered if any time is spent on gamification. There are growing concerns about ethical constraints surrounding implementation of gamification. Teachers should be aware of the copyright protection on the elements and ensure they are not violated. If necessary, permission should be obtained from the creators of existing game [15].

CONCLUSION

Gamification refers to a set of activities and processes to solve problems by using the characteristics of game elements. It is an umbrella term for using video game elements in non-gaming platforms with the goal of improving user experience and engagement. It is based on the idea that "fun can obviously change behavior for the better." It works because it triggers real human emotions such as happiness, joy, excitement, and accomplishment. By increasing the student's engagement using gamification, teachers increase the likeliness that lessons will be remembered.

Gamification is still rising in popularity. While gamification is gaining ground in business, marketing, corporate management, healthcare, edutainment, information studies, human–computer interaction, financial services, transportation, and engineering, its application in education is still an emerging trend [25]. Gamification has proved to be an efficient technique to boost engagement, motivation, and competition when it comes to learning. For more information about gamification in education, one should consult the books in [26-29].

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Figure 1 The concept of gamification [5].

Figure 2 Different uses of games.

Figure 3 A list of game mechanics [13].

Figure 4 Cchildren participating in gamification in the classroom [16].