



## Gamification in Higher Education: An Overview

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### Abstract

**Background:** Gamification in learning involves the use of game-based elements such as point scoring, peer competition, teamwork, and score tables to encourage participation, help students assimilate new information, and test their knowledge. We aimed to examine the effectiveness of gamification in students' learning and motivational outcomes in the educational context.

**Materials and Methods:** In this overview, two independent researchers have selected articles that examine the effect of Gamification on students learning and motivation in the Scopus, EMBASE, Cochrane, Web of Science, ERIC, and Medline databases without time and language restrictions up to Mar 2022.

**Results:** Finally, 10 relevant studies were selected. Results showed that students reported that gamification was an innovative, engaging, and efficient strategy for delivering curriculum materials; moreover, it was perceived as a fun activity. They can also provide opportunities for risk-free clinical decision-making, distance training, learning analysis, and quick feedback. In addition, the gamification method is statistically effective in improving students' knowledge, skills, and attitudes. In the field of medical education, the results showed that the medical field has done limited research on the use of gamification in educational platforms. Games in medical education, when used properly, can be a valuable tool for an instructor. Despite many simulation studies and gamification attempts, the medical community has not fully embraced gamification in residency education; and while games are not a substitute for traditional teaching, they do help students to master particularly difficult concepts.

**Conclusion:** Game benefits include improved communication and active learning based on interaction with other players. They help to organize knowledge, engage students, and motivate them to learn difficult material, but they also encourage students to take responsibility for their own learning.

**Key Words:** Education, Gamification, Learning, Motivation, Students.

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## 1- INTRODUCTION

Despite the emergence and development of new technologies, and the associated lifestyle changes in recent decades, education systems have retained the same traditional teaching methods and have not changed themselves according to the characteristics of the digital generation. This is despite the fact that the characteristics of digital residents were also reflected in their teaching and learning methods. Traditional teaching methods are boring and unappealing to students due to their extensive interaction with new media. Therefore, we need to look for creative ways to meet the needs of this generation, according to the characteristics of the digital people. One of the most effective teaching and learning strategies in education systems is gamification. Gamification in education involves using game elements to increase motivation, participation, and inclusive involvement in one's own learning tasks. At first, one might think that the use of games would be limited to younger age groups and used in primary education, but many researchers believe that this method can be applied to older age groups and higher education levels (1-5).

According to Detering et al. (2011), Gamification refers to the use (rather than the extension) of design (rather than game-based technology or other game-related practices) elements (rather than full-fledged games) that are characteristic of games (rather than play or playfulness) in non-game contexts (regardless of specific usage intentions, contexts, or media of implementation) (6). In today's digital age, gamification has become a popular tactic to encourage specific behaviors, and increase motivation and engagement. Commonly found in marketing strategies, it is also currently being implemented in many educational programs to help educators find a balance between achieving goals and meeting the evolving

student needs. The unique combination of pleasure, encouragement, positive feedback, and receiving feedback turns boring daily tasks into fun ones (7). Games involve people in challenging situations they are trying to overcome and receiving feedback based on their progress (8). Several lines of evidence suggest that games can be used as effective educational tools to enhance learning and comprehension of complex subjects (9, 10). Gamification uses gamification elements, such as awards or achievements, progress bars, awarding medals and badges, leaderboards, and points. The main basis of gamification is to use elements such as medals and championships to motivate learners, with the help of the medals that are given to the learners in each part of the learning, their efforts to receive medals and achieving better grades and involvement with the educational subject will increase (11). While there are many benefits that have been attributed to the game, it is important to note that if the game does not align with the learning goals, it loses its importance and value. Education through games can include many types of educational methods at the same time, each with its own characteristics, advantages and disadvantages. We aimed to review the effectiveness of gamification on students' learning and motivational outcomes in the educational context.

## 2- MATERIALS AND METHODS

This study addresses to a series of research questions aimed at uncovering insights into the use of gamification in the students' learning outcomes and motivation in higher education institutions. In this overview, all assessments, systematic reviews, and meta-analyses, evaluating the effects of the gamification on students' learning outcomes and motivation and considering the pros and cons of applying gamification in educational context, were searched on the

electronic databases of Scopus, EMBASE, Cochrane, Web of Science, ERIC, and Medline (via PubMed), with no language or time limitations (up to Jul 20, 2022). Two independent researchers conducted the search process, and one supervisor resolved any discrepancies on this issue. Two reviewers first screened abstracts of searched articles, downloaded their full texts for careful review, and selected the relevant studies independently. Finally, articles that met the inclusion criteria were included in the review, and relevant references were searched for further studies. The third reviewer resolved possible discrepancies.

### 3- RESULTS

Finally, 10 related articles were included. The general characteristics are as follows:

1. In a mini-review, aimed to review the use of gamification strategies during the COVID-19 pandemic and assess student's learning outcomes and motivation, the results showed that the students reported that gamification was an innovative, engaging, and effective strategy for providing educational materials; moreover, it was seen as a fun activity and, ultimately, suggested that gamification can be implemented with traditional lectures and can be a valuable tool during post-COVID times (12).
2. In a review, aimed to investigate what, why and how serious games influence teaching methods, the results suggested that serious games have been widely promoted in medical education to challenge the users to solve their teaching and learning problems. This method was supposed to entertain learners as well as teachers and provided opportunities for learner to develop different competencies (13).
3. In a review aimed to review the existing literature on the benefits of using game-based training platforms for medical education (both preclinical and clinical), and training, the results showed that the games and multimedia products have the potential to improve learner engagement, teamwork, and problem-solving for real-world issues. They can also provide opportunities for risk-free clinical decision-making, distance training, learning analytics, and rapid feedback (14).
4. In a review aimed to evaluate how gamification has been developed and explored by residency programs and to reveal otolaryngology's contribution to the gamification literature, findings suggested that the medical field has limited research regarding the use of gamification in educational platforms. Despite numerous simulation studies and attempts at gamification, the medical community has not fully embraced gamification in the residency education. Finally, researchers suggested that the medical education community should establish a definition of "gamification" and examine residency programs to identify desirable elements of gamification (15).
5. In a review aimed to shed light on the emergence and reinforcement of gamification in education/training, the results showed that improved motivation and participation in learning tasks was the main driver for apply gamification techniques, i.e. make learning more attractive, engaging and, ultimately, effective. Gamification techniques are applied to support learning in a variety of educational contexts and subject areas, but also to address transversal attitudes and behaviors such as collaboration, creativity, and self-guided study (16).
6. In a review (n=257 studies) investigating the results of the use of gamification in teaching statistics, the results showed that the majority of the reviewed studies were positively oriented

towards integrating gamification into statistics education. The few mentioned negative outcomes call for more attention to its design and integration (17).

**7.** In a review aimed to demonstrate the effectiveness of the board games in healthcare education (board games are tabletop games that typically use pieces - moved or placed on a pre-marked board (playing surface)- and usually include elements of table, card, role-playing, and miniature games as well); the results suggested that games in medical education, when used properly, can be valuable tools for an instructor. They create a non-threatening environment that supports mutual learning. A well-prepared game, tailored to the subject, makes it possible to master the material in less time than a traditional lecture. Games not only help to organize knowledge, engage and motivate students to learn difficult material, but also encourage students to take responsibility for their own learning. The biggest benefits of board games include improved communication and active learning based on interaction with other players. In addition, board games cannot replace traditional teaching, but they can help students to master particularly difficult concepts (18).

**8.** In a systematic review (n=60 studies), aimed to review the studies in the field of 'Gamification in e-Learning' and to provide an analysis of content of this field and its effectiveness in education, the results indicated the effectiveness of gamified e-learning environments in enhancing learners' ability, engagement and motivation (19).

**9.** In a systematic review (n=44 studies), aimed to investigate the current evidence on the use of gamification in the education of healthcare profession and understand what mechanisms are involved and how could explain the observed effects, the results have showed that it is possible to

improve learning outcomes in the education of healthcare professions by using gamification, especially when employing game attributes to improve learning behaviors and attitudes towards learning. No negative effects of using gamification have been observed (20).

**10.** In a systematic review and meta-analysis (2014-2018), aimed at determining the effectiveness of gamification method in improving the knowledge, skills and attitudes of children aged 6-10 years, the results showed that gamification method is statistically effective in enhancing students' knowledge, skills, and children's attitudes (21).

#### **4- DISCUSSION**

This overview aimed to examine the effectiveness of gamification in students' learning outcomes and motivation in the educational context. The results showed that gamification method is statistically effective in improving students' knowledge, skills, and attitudes. Students point out that gamification was an innovative, engaging, and efficient strategy for providing educational material; moreover, it was perceived a fun activity.

In today's education, the learning process is rarely attractive; however, the computer game process is very attractive. Due to their characteristics, games bring a sense of enjoyment and satisfaction; they are very stimulating and convey the concepts and facts of many subjects well. Therefore, the combination of game and learning increases students' learning motivation and makes the learning process engaging. Another attractive element of computer games is their interactivity. Nothing happens in the game world unless the player decides and does something (22, 23). Hamari et al. (2014) stated in their review that all of the studies that investigated the application of gamification in the education and learning,

reported the gamification training in learning were evaluated positively; for example, researchers have shown that educational games improve the level of learning by increasing motivation and involvement in learning tasks (24).

Research shows that serious games are an important educational tool for creating excitement and effectiveness in the learning environment due to its interactivity, engaging nature and comprehensive activities. By using educational games, students have the opportunity to experience solving problems and make decisions in a positive and risk-free learning environment. They can simulate work problems in real-life environment, which can be particularly useful in enhancing the performance of healthcare professionals.

Using practical games in teaching, unlike traditional methods, has high flexibility, high cost and strong interactivity. Gamification increases the motivation of learners and creates the conditions for changing the learning motivation from external to internal. The principle of learning is based on one's internal motivation, and until one has an internal motivation to learn, external motivation cannot change a person. Therefore, educational game designers should design educational games that help users find reasons to engage in the behavior rather than providing rewards for that behavior, in other words, rather than using the prizes for external motivation, they should use game elements to enhance internal motivation.

Obviously, in education, it is a very effective method of encouraging people's internal motivation. Furthermore, there is considerable evidence that games increase the focus of learners on the topic being taught and enable deeper and more stable learning. Many games are educational; learner also learns how to work with others, what rules to keep in mind,

positions, ways and methods to apply in the upcoming challenges. Games introduce people to the regulations and the environment, giving them the spirit of adaptation, and practical teaching of collective life skills (25-30).

On the other hand, some researchers have expressed concern about providing education in the form of gamification. They have said that the usage of computer games for education may also additionally have the implicit message that learning is not necessarily a hard task and has be continually fun (31). Most educational games use reinforcement as external motivation and repetition and practice. Reinforcement may cause undesirable and unwanted motivational reduction. If people are internally motivated, they no longer have to be continually advised and they do not need to be constantly encouraged to do the task. Also, although practicing skills will increase the speed of that skill and reduce mistakes, it no longer results in solving new tasks that require thinking (32).

Contemporary studies suggest that the teacher plays an important role in facilitating learning with computer games; the teacher guides the use of the game in the proper direction, explains, and investigates the experiences gained during the game. While many educational games are primarily based totally on behaviorism, they neglect the function of the teacher and make considering any external intervention unnecessary. Many researchers agree that computer games are educational tools that offer an opportunity for involved teachers. Therefore, the teacher's role is essential to create a learning experience (33).

Competition is one of the predominant factors in gamification strategies; however, it is important that other aspects of games, including positive efforts, cooperation and teamwork, are also taken into consideration and the aspect of learners' participation in games is considered. Also,

designing a gamification strategy is not easy. An ineffective strategy can also have a negative impact on learning outcomes and cause learners to become frustrated. Even the most interesting game becomes boring eventually.

## 5- CONCLUSION

A review of the literature on this subject reveals that today's rapid changes in communication and information technology have changed the teaching and learning. Gamification is one of the new and exciting changes in technology that has a very specific application in teaching and learning. The use of this technology in education is very effective because with this technology, you can teach and learn anytime and anywhere and people are less likely to attend training courses due to their busyness. The advantages of games include improved communication and active learning based on interaction with other players. Games help organize knowledge, engage students, and motivate them to learn difficult material, but they also encourage students to take responsibility for their own learning.

In the field of medical education, the results showed that there is limited research on the use of gamification in educational platforms in the medical field. Games in medical education, when used properly, can be valuable tools for instructors. Gamification in learning provides a useful and informal atmosphere, and helps learners practice real-world situations and challenges in a safe environment. Games generate motivation, provide immediate feedback, and allow learners to experience "fun" while playing the game, and when the level of interaction and participation is high, education continues. However, the use of games in education also has disadvantages. Disadvantages include people paying more attention to entertainment aspect and paying less attention to educational

discussion. In addition, game-based learning scenarios help promote competition among learners. Designing educational games is time-consuming, expensive, and requires experts in this field. Another criticism is the possibility of cheating in the games, especially in education. There is little to stop a student from searching the internet or looking up an answer. When games are the only method of assessment, it becomes almost impossible to determine what information students actually know and what they look up.

## 6- AUTHORS' CONTRIBUTIONS

Study conception or design: AJ and ZJ; Data analyzing and draft manuscript preparation: SA, and SF; Critical revision of the paper: ZJ; Supervision of the research: AJ and ZJ; Final approval of the version to be published: AJ, SA, SF, and ZJ.

**7- CONFLICT OF INTEREST:** None.

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