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Benefits And Challenges Of Using Gamification Across Distance Learning Platforms At Higher Education: A Systematic Review Of Research Studies Published During The COVID-19 Pandemic

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Abstract

There has been a noticeable interest in the use of digital game stimuli at higher education over the last couple of years. As a result of the transition to e-learning platforms caused by the COVID-19 pandemic, the interest in gamification has increased dramatically which may lead to changes about the benefits and challenges of using gamification in e-learning platforms. From this point of view, the current study aimed to navigate previous literature on the use of gamification in e-learning platforms at higher education, so as to highlight the benefits and challenges of employing gamification in electronic educational platforms. Research studies were monitored and reviewed using the systematic review approach. This is done through a set of inclusion and exclusion criteria through the Web of Science database. This has resulted in reaching twenty-four studies about the current study. The results have revealed some of the most prominent benefits of using gamification across distance learning platforms at higher education as follows: they help achieve the desired educational goals, measure learners' weaknesses and strengths, improve student learning, and motivate students towards learning, learners' acceptance of the gamification methodology and its ability to engage students in the educational process. On the other hand, some challenges have been shown as follow: the ability to manage virtual classroom, inappropriateness of gamification for the learners' sensory pattern, boredom resulting from repetition of activities, difficulty level of activities, lack of time, dissemination of negative feelings (nervousness, frustration, anxiety), and lack of internet service.

Keywords: gamification, e-learning platforms, elements of gamification, benefits, challenges, higher education.

Introduction

The widespread use of technology such as the web, social media, mobile, telephones, and other technologies has influenced educational processes at higher education institutions. This is due to what modern educational technologies provide such as raising the level of interaction in teaching and learning processes [1]. Nowadays, the teaching process is different from what it was like twenty years ago [2], which has made internet-based technologies gain importance day by day [3]. The web is a valuable resource and a complement to the traditional education of faculty members and students which is called e-learning or the use of web resources to create an interactive learning environment using computers and the Internet [4]. The various forms of e-learning and internet-based applications have become popular because they enable their users to directly access knowledge through various electronic devices connected to the Internet [5]. Thus, the concept and quality of e-learning is increasingly becoming widespread at the higher education sector [6], particularly after faculty and students being obliged to switch to e-learning platforms during the COVID-19 pandemic [7]. Despite the prevalence of the concept of e-learning in various educational institutions, especially higher education institutions [8], and the

increase in the number of students enrolling in this type of learning, which is estimated at more than 180 million students around the world [9], faculty members in higher education face many challenges in digital learning environments, including adapting teaching methods [10]. In contrast to traditional education, which requires the student's presence in the educational environment, e-learning allows the provision of diverse educational experiences collectively and individually through digital platforms without the need for physical presence in the educational environment [11]. Because academic courses are one of the important elements in the education system, it is important to rely on modern strategies in electronic courses [12]. Among the modern methods that have become a popular topic in the educational field is the use of the gamification methodology in e-learning environments [13], which is at the same time one of the ways that encourages students to learn and take active roles during the education process [14]. Where Deterding, Sicart, Nacke, O'Hara and Dixon [15] defines gamification as "the use of game design elements in non-game contexts with the aim of improving user experience and engagement." Shpakova, Dörfler and MacBryde [16] define gamification as "the process of making educational activities more like games in non-game contexts." Thus, gamification aims to elicit gaming principles by revealing why and how they motivate learners and then applying them in an educational context. Some previous studies also found that the use of gamification has many benefits, including giving freedom to fail without fear when learning [17], raising the level of engagement in learning [18], providing educational scaffolding that facilitates supportive learning based on user needs [19],providing a visual presentation of the student's progress in the learning process [20], and encouraging motivation through competition [21]. On the other hand, some previous studies showed some challenges in using gamification in e-learning environments, which included uncertainty about the effectiveness of results when using gamification in electronic courses [22], lack of knowledge, experience, and time limitations when planning the implementation of digital game stimuli [23], getting anxious when applying recent technological developments and accompanying innovations [24]. Foregoing, gamification approach has been applied in many teaching systems around the world to meet the educational needs, as well as provide motivational opportunities for students enrolled in these systems. For this reason, the use of gamification in the field of e-learning is becoming more and more important day by day [25].The rise in number for gamification methods during the previous years is due to the spread of its concept, the positive results it has achieves and the growing interest in games, especially for educational purposes [26]. This confirms that gamification is considered a promising methodology in all fields, including the field of education [27]. However, there are many studies that have focused on the elements of gamification before the Covid-19 pandemic, and because of the change in the educational context caused by this pandemic and the total transfer of higher education institutions to various electronic platforms [28], the use of gamification in the context of the Covid-19 pandemic calls for an independent systematic research study for the resulted unprecedented educational situation. Therefore, the current study aims to navigate the literature during the COVID-19 pandemic on the use of gamification in distance education environments and highlight the benefits and challenges facing faculty members and students in higher education by answering the following main question:

- What are the benefits and challenges ahead of using gamification in distance learning platforms at higher education during the COVID-19 pandemic?

The main question includes the following sub-questions:

1. What are the benefits of using gamification in distance learning platforms for higher education faculty members during the COVID-19 pandemic?
2. What are the benefits of using gamification in distance learning platforms for students in higher education during the COVID-19 pandemic?
3. What are the challenges of using gamification in distance learning platforms for higher education faculty members during the COVID-19 pandemic?

4. What are the challenges of using gamification in distance learning platforms for students in higher education during the COVID-19 pandemic?

Theoretical Framework

Technologies that assist in the design and implementation of gamification as well as the components of the educational process have become an important area of research in the current era [29]. Previous studies have mentioned the differences between "gamification" and "game-based learning", where "game-based learning" is defined as a learning method that uses game applications or games that are specifically designed to assist the learning process [30], while "gamification" is a method of learning that uses game elements completely in non-gaming contexts. Gamification is defined as the use of game elements in non-gaming contexts (Detering, et al., 2011). From the above, it can be said that Deterding, Sicart, Nacke, O'Hara and Dixon [15] defined the concept of gamification on four basic components, which are, respectively, game, game elements, design, and game-free contexts. Each component can be clarified as follows:

1- The game: Salen and Zimmerman [31] defined the game as a system that enables the player to participate in a digital conflict according to specific rules that produce quantifiable results, while the concept of the game refers to forms based on the rules of play activities, play refers to the exploratory and free activities (Groh, 2012). Thus, gamification is linked to the rules and objectives of the nature of the game.

2- Game elements: The game elements component aims to distinguish between the concept of gamification and other concepts related to games such as serious games [15], whereas the concept of serious games refers to fully developed games that serve non-recreational goals [15, 32], while the concept of gamification refers to the use of embedded game building blocks. In real contexts [15]. Thus Deterding, Sicart, Nacke, O'Hara and Dixon [15] suggest defining game design elements as those that characterize games; that is, items that make up the meaning of the game.

3- Design: The concept of the design component differs in its definition from the perspective of the design elements of gamification to the technologies that underpin the game. The technologies associated with games include various concepts such as game engines or controls, while the design of gamification involves a deliberate design process [15].

4- Game-free contexts: The term game-free context is not specific to potential environments for the application of gamification. In addition, leaving the concept open is important because it allows the use of different scenarios in non-game environments [15]. Thus, the only context excluded according to the previous definition is the use of game design elements, whether in the games themselves or in the process of gamification design.

Game design elements are the building blocks for the applications of gamification which are largely equivalent to game design patterns [15, 33]. In the context of games and gamification in particular, many literatures have suggested a set of recurring game design elements. For example, the [34] study suggested ten game components, some of which include self-representation through avatars, storyline, feedback, competition, and teams, while the study of Hunter and Werbach [33] identified fifteen important components, including avatars, badges, leader boards, points, and teams. The same study also focused on the so-called PBL triad, which consists of points, badges, and leader boards, which in turn are the most prominent elements of gamification. Despite the many similarities and overlaps between the elements of gamification, they differ greatly in their content as will be seen below:

1- Points: These are the basic element of games in general and in particular gamification. This is because they are usually given as a reward for successful achievement in specific activities; they also reflect the player's progress within the playing environment [33]. In the same context, there are different types of points, for example experience points, redeemable points, or reputation points, depending on the specific purpose of obtaining them [14]. Sailer and Homner [35] stated that the most important goals of the point's component is to give feedback to the user, and to serve as a measure of players' behaviour within the game.

2- Badges: They are defined as visual representations of the player's achievements, which can be earned and awarded within the environment of gamification [33]. The badges are also proof of the player's achievements, an expression of his traits, and a preservation of the rights of his achievements in terms of levels and goals [36]. Obtaining badges depends on achieving a certain number of points or achieving certain specific activities within the game [14]. Thus, the badges are consistent with the concept of points in giving the player immediate feedback on his performance within the game, and they do not usually contain the narrative meaning, and collecting them is not mandatory. On the other hand, badges differ from points in their effect on players' behaviour, which in turn leads them to choose specific paths and take on specific in-game challenges in order to earn the desired badges [37]. In addition, badges symbolize an individual's membership in a particular group and distinguish them from peers in other groups which may lead to practices that have social effects on players and participants, especially if they are infrequent or difficult to attain [38].

3- Leaderboards: It ranks players according to their relative success; that is by measuring their performance against a certain success criterion [39]. A leaderboard can help determine the best performers in a given activity [38].

4- Thus, it is a competitive indicator that shows how much progress compare the performance of the player himself to the performance of others. In this context, Hunter and Werbach [33] point out that the leaderboard acts as a catalyst when the player leads the activity, while it may discourage players who find themselves in the lower ranks of the leaderboard. In addition, the competition caused by leaderboards can create social pressure to increase the level of player participation, and thus can have a constructive effect on participation and learning [40]. However, the positive effects of competition are more than plausible if the competitors involved are roughly at the same level of performance [41].

5- Performance graphs: They provide information about players' performance compared to their previous performance during the game [35]. Unlike the leaderboard, the performance graphs do not compare a player's performance to other players'; rather, they evaluate a player's performance over time in the game. The performance graphs are based on the individual benchmark, while the leaderboards are based on the group's benchmark, by graphically displaying the player's performance over a specified period.

6- Storyline: It is an element of game design that is not related to a player's performance. Storyline can be included in the context of the game application such as: activities and characters, which in turn gives meaning beyond just searching for points and achievements [20]. Storytelling can also be directed towards real non-game representations or simulated similes of the real world, thus motivating the player, especially if the storytelling is in line with the players' interests [42]. From the above, storyline plays an important role in the game by making the activities close to the player's mind, which leads to getting motivated and avoid feeling bored.

7- Avatars: They are visual representations of players within a game or gamification environment [33]. They are usually chosen or even created by the players themselves [20]. Avatars can be designed in many forms: diagrams, animations, and 3D graphics. The main reason for choosing or creating avatars is to distinguish the player himself from other players within the game [33]. Thus, avatars allow players to adopt or create a certain identity in co-op games so that the player gets himself part of the game community.

8- Team: The formation of teams within the game is one of the basic components of games, whether team members are real or virtual players, which can create competition, conflict, and cooperation within the game [20]. The team component within the game also contributes to creating cooperation between players to achieve a common goal within the game environment [33].

Methodology

The current study used a systematic review approach to analyse the research published during the COVID-19 pandemic on the use of gamification across distance learning platforms at higher education within the foreign database Web of Science. The data in the current research was collected by reviewing 1993 peer-reviewed articles published between 2020 and 2021. The systematic

review in the current study relied on four pillars: a clearly defined objective, a specific research question, a clear methodology, and inclusion and exclusion criteria [43]. The current study was also based on three phases, as suggested by Kitchenham and Charters [44], (1) planning, (2) structure, and (3) results, as shown in Figure 1:

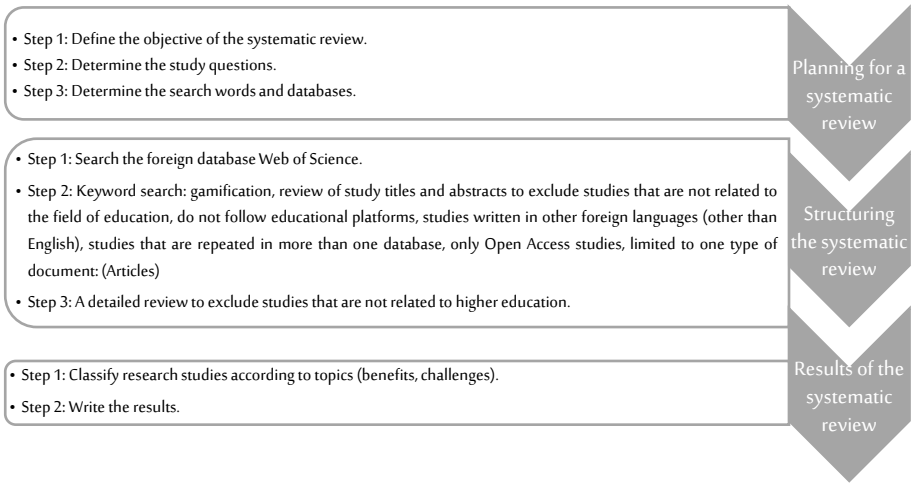

Figure 1: Stages of a systematic review

Planning

- **The objective of the systematic review**

Although there are many studies on the use of gamification in distance learning platforms, there are no systematic reviews that have addressed the benefits and challenges of using gamification in distance learning platforms at higher education during the COVID-19 pandemic. Thus, the current study aims to identify the benefits and challenges of using gamification for faculty members and students affiliated with higher education in the COVID-19 pandemic period**.**

- **Designing a review protocol**

The systematic review approach is a way of presenting previous literature on a particular topic (Khan et al., 2003). The methodology of the current study enables the researcher to compile the results of research that dealt with the topic of using gamification in distance education platforms at higher education, which in turn revealed the research gap in not addressing the benefits and challenges of using gamification in distance education platforms at higher education during the Covid pandemic. - 19. Thus, the term "gamification" was used as a keyword for a search in the foreign database Web of Science. The current study was also limited to the review between 2020 and 2021, specifically from 1/1/2020 to 31/12/2021, during the Covid-19 pandemic. Figure 2 shows the criteria considered for the selection of relevant research**.**

Exclusion Criteria

- Exclude all words except “gamification”	- Define the research keyword "gamification”
- Research not in the foreign database, Web of Science.	- Research within the foreign database, Web of Science.
- Research before the start of the COVID-19 pandemic-2020) .(2021	- Research at the start of the COVID-19 pandemic-2020) .(2021

Inclusion Criteria

- All types of research except for articles	- Articles type research
- Research that requires payment fees	- Open-access research. -
- Research papers written in other languages (other than English).	- Research papers written in English. -
- Research papers that do not use gamification through distance education platforms -	- Research papers that use gamification via distance learning platforms.
- Non-specialized research in the higher education sector	- Research in the higher education sector

Figure 2: Inclusion and exclusion criteria

Structure

- **Applying the review protocol**

At this stage, the search keyword is used. It also specified synonyms for the search keyword. Thus, the search engine of the foreign database Web of Science was searched according to the following absolute values: ((gamification" OR "Gamified") AND ("gamification element" OR "gamification components") AND ("distance learning" OR" e-learning" OR "online learning")).

- **Selecting research papers**

After entering the absolute value into the Web of Science foreign database search engine, the results were initially evaluated to ensure that studies matched the inclusion and exclusion criteria for the current study. At this stage, many studies were excluded, including but not limited to studies conducted in traditional (non-virtual) learning environments, studies that are related to the stages of general education, studies not written in English, theoretical and conceptual studies. After that, the reviews of the remaining studies were read, and the selection phase of studies concluded that twenty-four studies were included as shown in Table 1, which were uploaded and transferred to the MAXQDA analytical program, and analyzed as described in the search results section.

Results

Table 1 shows the results of the systematic review that met the inclusion and exclusion criteria for the current study. It resulted in twenty-four studies extracted from the foreign database Web of Science. It is noted from the table that there are eighteen studies that showed the benefits of using digital game stimuli via distance learning platforms at higher education, two studies that mentioned the challenges of using gamification, and four studies that reported the benefits and challenges of using gamification together. The table also shows that fourteen studies followed the quantitative approach, two studies used the qualitative approach, and eight studies used the mixed approach. In the context of the targeted sample of the studies, twenty-two studies targeted higher education students, one study targeted higher education teachers, and one study included students and teachers. Within the distance learning platforms used in the studies included in the current study, seven studies used Moodle, five studies used a variety of platforms, two studies used Kahoot, two studies did not mention the name of the platforms, and eight studies used various platforms as follows: Edu-Escape Room, Telegram, Baicizhan, Didactic City, BeHere, Zoom, Joule Bug, and Word Press.

Table 1. The results of the systematic review of the studies that were selected according to the inclusion and exclusion criteria

Author's name and year of publication	Methods	Benefits / Challenges	System / Platform	Target Sample	Results
Bovermann & Bastiaens (2020) [45]	Quantitative method	Benefits: Forum activity is related to the style of game users who like to interact with others, work in teams, and share their knowledge with fellow students. Peer assessment activity is related to the style of game users who like to interact with others, work in teams, share their knowledge, and are most motivated when seen by others. Test activity is related to the style of game users who like to spend time trying things out. Task activity is related to the pattern of game users who want to interact with others and know what they are doing and what they need to achieve. The educational lesson activity is related to the	Moodle	Bachelor's and master's Students in Educational Sciences	Variation in levels of agreement between game user styles (social, creative, achiever, philanthropist, gamer) with online educational activities (forum, peer assessment, test, task, lesson, wiki).

		pattern of game users who want to interact with others, know their learning progress, and work towards specific educational goals. It is also associated with those who wish to help others and have a deep meaning for things. Wiki activity relates to the style of game users who want to interact, work in groups, keep practicing, and share their knowledge with others.			
Campillo-Ferrer, Miralles-Martínez & Sánchez-Ibáñez (2020) [46]	Quantitative method	Benefits: The students positively accepted the use of Kahoot. Using Kahoot provided the opportunity to work in group activities which resulted in students respecting each other and accepting different viewpoints. Using Kahoot allowed the acquisition of knowledge in a different, unconventional	Kahoot	Elementary school students	Incorporating a game-based student response system into the teaching process improved students' awareness of certain concepts in social science teaching, increased their active participation in the lesson, and motivated them to learn in a more interactive and stimulating environment.

		way, and developed a set of skills and abilities associated with social and civic competencies.			
Castillo-Cuesta (2020) [47]	Mixed method	Benefits: The use of Educaplay improves the acquisition of sub-skills in English: vocabulary and grammar. The use of Educaplay motivates learners to learn English and develops educational activities within the Canvas Learning Management System. The use of Educaplay makes the educational activities more participatory, which attracts students' interest in learning English. The easy access to educational activities via Educaplay helped learners participate in learning English. The easy use of Educaplay	Educaplay via Canvas	Communicatio n grammar course students	The results showed that gamification is useful in improving learners' grammar in the aspects of (deficiency verbs, abstract verbs, and infinitives). Students also showed an improvement in their knowledge of vocabulary, especially in topics related to jobs and education.

		helped learners learn vocabulary and grammar. Using Educaplay helped teachers identify strengths and weaknesses in students' vocabulary and grammar.			
de-Marcos, Garcia-Cabot, Garcia-Lopez, Ramírez-Valarde, Teixeira & Martínez-Herráiz (2020) [48]	Quantitative method	Benefits: The use of gamification in the electronic course created an interactive environment that increased students' communication with each other. The elements of gamification (points and achievements) contributed to giving a statistical description of the student's activity within the electronic course.	Moodle and Elgg	Students of the digital teacher skills course	**The results of the social network analysis showed a positive impact on the social network structure of the e-course. The results of the study also revealed that the model used showed a greater probability of passing the course in favor of the experimental group (based on gamification) compared to the control group.**
Díaz-Ramírez (2020) [49]	Quantitative method	Benefits: Active students who played the game showed a greater success rate and greater involvement in problem-solving activities compared to passive players.	Not mentioned	First- and second-year students of the Industrial Engineering, Systems Engineering, and Management Engineering programs, of the University of Monterey	The positive effect of gamification on academic performance and other desirable social bonding behaviors, such as a sense of belonging and teamwork.

		Active players realized that the game contributed to a better learning process, corporate activities helped them increase the sense of belonging to the organization, and teamwork activities helped improve their learning. Extrinsic rewards were the main motivators that promoted active game play.			
Garcia-Iruela, Fonseca, Hijon-Neira & Chambel (2020) [50]	Quantitative method	Challenges: The study did not find a relationship between learner activity and gamification methodology, nor between activity and learning.	Moodle	Computer engineering students	The study did not find a relationship between learner activity and gamification, nor between activity and learning.
Gündüz & Akkoyunlu (2020) [51]	Mixed method	Benefits: The flipped classroom environment based on online gamification has increased the number of digital page views. Game components increased the	WordPress (WP)	Students of Instructional Design Course, State University	The experimental group (flipped classroom environment based on gamification) got higher scores in terms of interaction, participation, and achievement compared to the control group.

		time students spent on the website. Game components are effective in influencing students' blogging habits. The flipped classroom environment based on online gamification is effective in increasing the number of participants in educational activities. There is a positive impact on student achievement when learning through a gamification-based flipped classroom environment.			
Mahmud, Husnin & Tuan Soh (2020) [52]	Mixed method	Benefits: The importance of the teacher's role and presence in implementing the gamification methodology across e-learning environments, especially because of its positive impact on the sustainability of knowledge, environmentall	JouleBug	Students of two courses: Environmental Responsibility and The Education Environment and Sustainability	The results showed positive use of the JouleBug application with the actual presence of the teacher on the sustainability of knowledge, environmentally friendly behaviors, and student performance. The results also revealed the motivations for the sustainability of students' participation in the environment of gamification activities as follows: getting to know teachers and peers, competition, and a sense

		y friendly behaviors, and student performance. Using the gamification methodology across e-learning environments leads to the identification of teachers and peers by learners, creating a spirit of competition, and a sense of belonging to the group. Challenges: Lack of time, boredom caused by poor social interaction, boredom caused by repetition of activities and their level of difficulty are among the challenges that learners face while performing educational activities based on gamification across e-learning environments.			of belonging to the group. On the other hand, the challenges were lack of time, boredom caused by poor social interaction, boredom caused by repetition of activities and their level of difficulty.
O'Connell, Tomaselli & Stobart-Gallagher (2020) [53]	Quantitative method	Benefits: Gamification-based activities are fun, educational, engaging and	Zoom	resident doctors, emergency و medicine specialty,	Most residents found the educational activity based on gamification entertaining, engaging, and better than a traditional lecture.

		are better received when compared to the traditional lecture format.		Thomas Jefferson University Hospital	
Pinter, Čisar, Balogh & Manojlović (2020) [54]	Quantitative method	Benefits: Gamification increases student attendance in the classroom. Leaderboard is a motivational element for students. Badges awarded for active participation in classes are an incentive.	BeHere	Students of Subotica Tech, College of Applied Sciences	The BeHere motivation model motivated students to attend virtual classes more regularly.
Author's name and year of publication	Methods	Benefits / Challenges	System / Platform	Target Sample	Results
Seidlein, Bettin, Franikowski & Salloch (2020) [55]	Quantitative method	Benefits: The ability of the TERMInator tool which is based on gamification to increase student motivation and satisfaction. The gamification-based TERMINator tool has made the digitization of tests easier.	TERMInator via Moodle	Medical students of the University of Greifswald	The gamification-based TERMINator is positively rated. Also, the students greatly appreciated the new e-learning tool, and emphasized the need to expand the use of the tool. In addition, working with TERMINator is very easy. Moreover, the tasks were easy to understand and a good complement to the contents of the medical seminars. The size and quality of the image provided was very appropriate. The students' learning strategies were also different. Finally, although e-learning

					options were generally rated very important, the students' lessons were by far the most important.
Uzunboylu, Galimova, Kurbanov, Belyalova, Deberdeeva & Timofeeva (2020) [56]	Qualitative method	Benefits: Employing "Kahoot" software leads to effective learning, continuous fun, supportive teaching, and inclusive competition. Using the "Kahoot" can help reveal deficiencies, raise motivation, facilitate the teaching process, and can lead to a high level of student interaction with their teacher and other students, and ease of use. Challenges: There must be an internet service provided for the use of "Kahoot". The use of "Kahoot" affects virtual classroom management.	Kahoot	Fourth-level students - teacher preparation - College of Education	Kahoot is widely useful for students and teachers. The results also concluded that Kahoot is useful in eliminating deficiencies in the learning process. Also, one of the drawbacks of Kahoot lies in the fact that it is an Internet-based program.
Vanduhe, Nat & Hasan (2020) [57]	Quantitative method	Benefits: Using a gamification-based platform that increases	Moodle	Teachers at Cyprus International University	1. Recognizing ease of use and direction are critical to continuing intentions to use Moodle's

		trainees' engagement and behavioral intentions toward training. Using a gamification platform that makes the trainees excited.			gamification system for training. 2. Perceived benefit mediates relationships through social appreciation, appropriateness of the technological task, perceived ease of use, and social impact on continuity of intentions. 3. When expecting continuity of intent, suitability of the technological task, social appreciation, suitability of the technological task, and social impact, perceived ease of use are vital. 4. The suitability of the technological task positively affects the perceived usability. **5.** There is no indication of the effect of both the appropriateness of the technological task and the social impact on the perceived benefit**.**
Zaric, Lukarov & Schroder (2020) [58]	Mixed method	Benefits: Gamification has a positive effect on learners' styles (visual, intuitive, reflective, open to the world). Challenges: Gamification has a negative impact on sensory learner style.	Moodle	Bachelor of Computer Science students	The positive impact of badges, leaderboards, and experience points on learners who have visual, intuitive, reflective, and open-to-the-world learning tendencies, and negatively on students with sensory learning tendencies.

Acosta-Medina, Torres-Barreto & Cárdenas-Parga (2021) [59]	Quantitative method	Benefits: Students prefer gamification in their own virtual learning environments. Gamification technology generates a comprehensive and immersive environment that facilitates the acquisition of knowledge and increases students' motivation.	Didactic City	Columbia university students	The use of gamification tools in virtual learning environments leads to the following factors: students' benefits, enjoyment generated by the tools, and improvement of knowledge.
Ahmed & Asiksoy (2021) [60]	Mixed method	Benefits: Gamification elements (badges and levels) play an effective role in developing students' creative skills. Challenges: Ineffectiveness of flipped classrooms based on gamification in learners' self-efficacy.	Moodle	First year students of physics lab course	The results have shown a positive effectiveness of the flipped classes based on gamification in students' innovation skills, while there have been no statistically significant differences in the effectiveness of the flipped classes based on gamification in self-efficacy. Additionally, the qualitative results revealed a positive perception among students towards gamification.
Dindar, Ren & Järvenoja (2021) [61]	Quantitative method	Benefits: Students in the context of competitive and cooperative gamification are equal when it comes to the completion of educational tasks, academic achievement, and motivation	Baicizhan	Chinese university students	No difference has been observed between the two gamification groups (cooperative/competitive) on educational task completion, academic achievement, and motivation, while the social bonding in the (cooperative) gamification group was much higher than in the other (competitive) group.

		to learn vocabulary. In the context of cooperative gamification, students show greater social bonding than in the context of competitive gamification.			
Duggal, Gupta & Singh (2021) [62]	Mixed method	Benefits: The proposed gamification framework has increased students' engagement rate through several components (attendance-based system (Coin), fun-based learning, electronic tests, and oral discussions) within the electronic course. The proposed gamification framework led to raising the level of students' educational performance. The dynamics and mechanics of gamification such as: challenges, competition, prizes, progression processes, daily analyses played	Proposed gama frame	Students at the University of Duba Jalandhar	The students of the experimental group (suggested gamma frame) showed greater participation compared to the control group.

		an important role in achieving the desired educational goals.			
Fu, Zhang, Zhao & Chen (2021) [63]	Qualitative method	Benefits: Gamification-based applications offer interesting learning methods that increase students' enjoyment during the learning process. Students were welcome to learn vocabulary through gamification-based applications. Gamification-based applications enhance learner autonomy, which results in a reinforcement of learner behaviors towards continuous and orderly learning of vocabulary. Challenges: Some students whose motivations and learning habits were not affected by using gamification-	A group of vocabulary learning applications	Chinese college students of science, technology, engineering, and mathematics majors	The results have shown that challenge, teams, leaderboard, competition, cryptocurrency, and badges are among the favorite gamification elements of students in the learning environments. It also has shown that students believe that the effects of stimulating activation of the applications were obvious through receiving immediate feedback, enjoyment, a sense of accomplishment, while the effects of stimuli were obvious through distraction, additional competitive stress, and incomplete word matching. Furthermore, some students believed that the apps helped form vocabulary learning habits because of its convenience, reward mechanism, and team setting, while others did not help because they had a particular learning method.

		based applications.			
Ong, Mohan, Han, Chew & Fung (2021) [64]	Quantitative method	Benefits: Telegram Quiz Bot-based tests helped students realize their cognitive achievement on the one hand, and cognitive loss on the other. Telegram Quiz Bot-based quizzes improved students' mastery of the content presented.	Telegram	Students of chemistry course	Most students' responses to the use of the Telegram Quiz Bot were positive.
Pakinee & Puritat (2021) [65]	Mixed method	Benefits: Each element of gamification (points, levels, progression, challenges, avatars, and leaderboard) according to the learner's personal characteristics has its pros and cons in improving knowledge. The use of gamification elements in the e-learning environment improves students' engagement in the e-course. The use of gamification elements in the	Not mentioned	Media arts and technology students	Choosing all gamification elements according to personality traits does not improve knowledge, howevwr, it does lead to better learning engagement in the online course.

		form of short tasks leads to more involvement of the learner in the electronic course.			
Reyes, Gálvez & Enfedaque (2021) [66]	Mixed method	Benefits: The gamification-based activity improved students' interest in studying the electronic course and helped them learn and master its content. The gamification-based activity improved students' involvement in the educational process, which resulted in passing the electronic course. Positive perceptions of students towards the methodology of gamification.	Moodle	Lecturers and students of the building and construction tools course	There is a ppositive effect of gamification-based activity on motivation and the learning process, as well as on the number of students who passed the course. Moreover, students' perceptions of gamification-based activity are positive.
Yllana-Prieto, Jeong & González-Gómez (2021) [67]	Quantitative method	Benefits: The use of Edu-Escape Room in STEM courses increases students' self-efficacy. Positive attitude of	Edu-Escape Room	Science course students	According to the analyzes, the results have shown an increase in self-efficacy and a positive attitude among the sample members in the experimental group. Also, the results revealed an increase in positive emotions (joy,

		students using Edu-Escape Room towards STEM Courses. Raise the level of joy, satisfaction, and fun for students by using the Edu-Escape Room in STEM Courses. Challenges: Using Edu-Escape Room in STEM Courses leads to some negative feelings (nervousness, frustration, and anxiety).			satisfaction, and pleasure) and negative emotions (nervousness, frustration, and anxiety).
Zaric, Roepke, Lukarov & Schroeder (2021) [68]	Quantitative method	Challenges: The high academic participation of students with sensory inclinations in the context of gamification. The use of game elements in educational activities raised the emotional and cognitive engagement of students with sensory inclinations.	Moodle	Computer science students	Gamification-based design contributes positively to academic engagement, learner engagement, and student learning moderation.

Within the framework of the results of the study with reference to the questions of the current study, which aimed at revealing the benefits and challenges of using digital game stimuli through distance learning platforms for students and teachers of higher education through studies published during the Covid-19 pandemic. Studies have reported on the side of the benefits of using gamification by teachers that they help achieve the desired educational goals [62], and measuring the

weaknesses and strengths of learners [47], while the most mentioned benefits in the studies included in the current study on the part of higher education students were as follows: The ability of gamification to improve student learning [11, 22, 28, 30, 34, 35, 44, 50, 51, 56, 62], followed by the ability of gamification to motivate students towards learning [47, 49, 54-56, 59, 61, 63], then by learners' acceptance of the gamification methodology [46, 53, 59, 60, 63, 66, 67].Gamification has also been shown as a tool that engage students in the educational process [49, 51, 62, 65, 66, 68], and motivate students to participate in learning [51, 54, 57, 68].Furthermore, gamification can self-assess [48, 56, 64]. The opportunity for teamwork is one of the benefits of gamification reported by embedded studies [46, 47, 52]. In addition, it can create an interactive environment [48, 56]. Its ability to individualize learning [45, 58]. Finally, gamification is an unconventional approach [46, 55]. On the other hand, classroom management challenge by teachers was an obstacle towards the use of gamification in distance education platforms [56]. On the other hand, the biggest challenges on the part of higher education students regarding the use of gamification were as follows: the inappropriateness of gamification for the learners' sensory style [58], boredom resulting from repetition of activities; difficulty level of activities, and lack of time [52], broadcasting negative feelings (nervousness, frustration, anxiety) [67], and lack of internet access [56].

Discussion

Through a systematic review of studies published during the COVID-19 pandemic, the current study focused on the benefits and challenges of using gamification across distance learning platforms for higher education students and teachers. It considered a set of inclusion and exclusion criteria, including studies related to the concept of gamification through a specific database, which is the Web of Science, as well as studies written in English, open access, article type, and studies that used gamification across distance learning platforms in the higher education sector. Thus, the current study provided a clear picture of the benefits and challenges of applying gamification across e-learning environments for teachers and students of higher education during the pandemic period. In general, the role of the gamification methodology has become clear in improving many educational aspects and the dimensions associated, whether for the teacher or the student, due to the advantages and unconventional exciting methods that this stimulus technique possesses. In view of what the studies have reported, it can be said that the use of gamification in non-traditional learning environments (face to face) helps teachers in the first aspect of measuring the levels of their students in the educational process and identifying their strengths and weaknesses, as well as greatly helping to achieve the educational goals set for the educational situation**.** As for the second aspect, which is related to students, we stand in front of many benefits that are in the interest of the student. Most of the studies published during the COVID-19 pandemic have reported the ability of gamification to improve cognitive and skill educational aspects. This agrees with the results of Ortiz Rojas, Chiluiza and Valcke [69] study, which confirmed through a systematic review that gamification can directly improve student learning. Its ability to motivate the learner and entice him to learn in an indirect manner that is likable to the student, which is consistent with the study of Zainuddin, Chu, Shujahat and Perera [70], who mentioned in their study of the systematic review methodology that the components of gamification are effective in motivating students towards learning. In addition, studies reported the positive acceptance of the gamification methodology by learners, which may explain the rapid spread of the methodology in the education sector, especially in higher education institutions [6]. Moreover, the elements and mechanisms of gamification could successfully engage the learner in the educational situation and increase his participation in the accompanying educational activities. This agrees with a number of studies that confirmed that gamification is an effective tool in students' involvement in the educational process via the Internet [71-76]. This is also consistent with the results of several studies that indicated the effectiveness of gamification that is employed via digital platforms in developing psychological happiness [40], self-organized learning [38], and

motivation for achievement [77-78]. The previous results are supported by several theories, including the Constructivism Theory, which indicates in its content that the learning environment must include some components that motivate the learner to actively participate in building his knowledge in an individual or social framework [79-87]. This is what gamification systems can do with individual motivators such as points and social motivators as leaderboards. This is also consistent with the Self-Determination Theory (SDT), which indicates in its content that the learner's movement towards the implementation of tasks is driven by a set of internal motives, which the higher the level is, the more capable the learner becomes to self-determination and his actions, and that the learner's behavior requires support and appropriate feedback from the social environment, which gamification can do [88-91]. According to the Motivation Theory (MT), in the part associated with extrinsic motivation, which is represented by the set of extrinsic incentives for which gamification plays its role such as points, badges and leaderboards, this type of incentives has a great role in motivating learners to complete and enjoy learning tasks, and can compensate for the difference between internal motivation and the real level of the learner [92, 93]. Behaviorism refers to behavior as a set of responses resulting from the stimuli of the immediate external environment, which is either supported or reinforced so that its occurrence is strengthened in the future, or otherwise does not receive support, and however is less likely to occur. Learning is built to support and reinforce performance that is close to behavior, and this reinforces the use of gamification to enhance the learner's performance and repeatedly motivate him towards continuing to complete the learning tasks [94]. This is in line with the principles of Skinner partial reinforcement, in which he sees that non-continuous reinforcement or selective reinforcement leads to greater continuity of practices and no extinguishment of positive responses, in contrast to continuous reinforcement [92]. On the other hand, the use of gamification via distance education platforms faces challenges that require researchers in the first place to study and find solutions to address them, and get teachers avoid these challenges when preparing for the electronic course, allow decision makers in higher education institutions to intervene, so as to benefit more from the gamification methodology in e-learning environments. Among those challenges is what the studies included in the current study [52, 56, 58, 67] have reported including the inappropriateness of gamification for the sensory type of learners, boredom caused by repetitive activities, difficulty level of activities, lack of time, dissemination of negative feelings (nervousness, frustration, anxiety), lack of internet service. Therefore, the challenges of using gamification across distance learning platforms for students and teachers of higher education are very small in front of the benefits of employing gamification in e-learning environments**.**

Conclusion

The current research is from research that focused on monitoring the benefits and challenges of using gamification systems across distance education platforms during the Covid-19 pandemic through a systematic review process for studies conducted in the era of Covid-19. This is in order to be able to come up with lessons learned that lay the foundation for increasing the effectiveness of distance education platforms in higher education institutions after the pandemic. The systematic review process has been able to identify the most important benefits through the ability of gamification to achieve educational goals, identify strengths and weaknesses of students, and promote engagement. As for the most important challenges, they focused on how to manage the virtual classroom, and the occurrence of a kind of boredom as a result of repetitive activities, and the lack of time associated with the implementation of some tasks. The outputs of the current research paper contribute to the development of the structure of distance education platforms during and after educational emergencies, and shed light on the most important challenges that must be planned to be addressed by those responsible for e-learning in institutions of higher education. In future papers, the impact of gamification elements on specific learning outcomes during and after the COVID-19 pandemic can be discussed. In addition, it is important to conduct bibliometric studies on the context of learning through digital platforms based on gamification during the COVID-19

pandemic. It is also crucial to find out how can learning management systems be developed to be more effective according to the elements and tools of gamification**.**

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