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Theories, Strategies and Elements of Gamified MOOCs: A Systematic Literature Review

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ABSTRACT

A few years before, MOOCs appeared and developed at a rapid pace. Various MOOC methods, theories, strategies, elements, and techniques were used to improve distance education. In their development, their weaknesses like dropout, low participation, low completion rate, low engagement, and others have emerged that are addressed by recent studies including that of gamified and adaptive gamified MOOCs. This article presents the most important theories, strategies, and elements used in gamification and their usefulness and contribution to MOOCs, with the ultimate goal of proving rich information to researchers, application designers, and practitioners of gamified and adaptive gamified MOOCs.

Keywords: Gamified MOOCs, Adaptive Gamified MOOCs, Gamification Theories, Strategies and Elements, Challenges

Ⅰ. Introduction

This review paper aims to offer a comprehensive systematic literature review to delve into the underlying different gamification theories, strategies, and elements within the realm of gamified and adaptive gamified MOOCs. Overall, the paper summarizes the current state of gamified and adaptive gamified MOOCs, creates an inventory of gamification theories, strategies, and elements, mainly in MOOCs, and discusses findings in recent research papers.

Also, this study garnered extra attention during the COVID-19 epidemic, which was characterized by the rapid evolution of distance education. The researchers were deeply concerned about the failure of learning results found in traditional MOOCs, which are characterized by low engagement and high dropout rates.

Emphasis is placed on informing and interpreting primary literature on gamification theories, strategies, and elements by synthesizing results from multiple literature works to produce a coherent argument on

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gamification theories, strategies, and elements.

Distance education allows students to access and interact with high-quality educational content from anywhere and anytime via the Internet. A Massive Open Online Course (MOOC) is a free online and massive course without prerequisites, in a flexible learning environment, that allows for unlimited participation and open access via the Internet by anyone and anywhere.

Gamification is defined as a method using game elements and strategies in non-game contexts, such as MOOCs, by increasing engagement in achieving specific goals (Deterding et al., 2011; Dichev and Dicheva, 2017; Kapp, 2012).

Adaptive gamification in MOOCs is a rapidly expanding study topic that augments classic gamification methodologies with user-centered, personalized, and adaptive motivating criteria tailored to the individual characteristics of distinct users and circumstances (Hallifax et al., 2021). Several learner characteristics are employed to tailor course content, peers, and other features to the needs of each learner (Papadimitriou and Gyftodimos, 2017).

The *effectiveness* of traditional MOOCs is the main goal of gamified and Adaptive gamified MOOCs. The effectiveness of an application indicates how well it produces results. *Gamification effectiveness* is influenced by three primary dimensions: user experience, behavioral changes and user achievements, and motivation (Ahbari et al., 2021). The success of gamification in MOOCs relates to how well it addresses the shortcomings and challenges of conventional MOOCs, such as poor engagement and dropout rates. Kim (2015) believes that gamification in education is a very effective tool for improving students' attention and motivation to commit to a mission and influence their behavior.

Gamification comes as an effective method to enhance the user experience by making learning enjoyable, motivating users, making learning fun, and increasing engagement in achieving specific goals through the satisfaction of the needs for competence, autonomy, and relatedness (Deterding et al., 2011; Ryan and Deci, 2020; Nicholson, 2015). Keller (2008) defines motivation as a theoretical concept that represents human behavior and can lead to positive cognitive outcomes such as more effective learning and achievement. Motivation is considered a key factor in improving students' engagement and retention in distance learning (Hone and El Said, 2016). It is critical to understand the importance of user experience while designing for user motivation. User experience directly impacts user engagement, performance and retention (Kim, 2015; Kim and Song, 2021).

According to Hamari et al. (2014), gamification influences user motivation to use the system, which impacts psychological outcomes (like improved learning or enhanced attention), which then causes behavioral outcomes (better performance). As presented below, the theory-based (multi-component) gamification strategy (Peña et al., 2020) is a new strategy to enhance motivation and engagement in beneficial behavioral changes.

Moreover, the service-based gamification strategy (Blohm and Leimeister, 2013) is intended to demonstrate how gamification might use intrinsic and extrinsic motivators to effect behavioral change and rethink activities such as learning.

The *gamification theory* states that gamification does not directly affect learning but more readily drives a learning-related behavior in a mediating or moderating process, indicating that when game-like features are presented, individuals are more likely to retain (and enjoy) learning (Zaric et al., 2021).

A *gamification strategy* is an intentional method for using gamification techniques to achieve partic-

ular objectives. Gamification strategies are widely used in higher education, particularly in distance education, to boost student motivation and engagement in a learning activity (Chans and Portuguez, 2021).

Gamification elements include game components, such as leaderboards, levels, points, badges, challenges, feedback, and so on that establish gamification.

Academics' top concern is the significance of MOOCs' achievement, influence, and longevity. Studying the evolution and contribution of MOOCs to distance education so far, the following burning problems of the traditional ones that reduce their effectiveness have been identified: high dropout rate, low participation, low completion rate, high attrition rate, feeling of loneliness, low engagement, low retention rate, low user collaboration, a lack of learner motivation, diversity of MOOC users and the low validity of methods for assessing learners' knowledge, etc. To address these problems and increase the effectiveness of traditional MOOCs, two main research areas were developed, adaptive and intelligent MOOCs and gamified and adaptive gamified MOOCs. For gamified and adaptive gamified MOOCs, various theories, strategies, and elements have been developed to address the problems of traditional MOOCs presented in this article.

Researchers have experimented with different approaches and implementations to solve the challenges and shortcomings that traditional MOOCs present. This article gives a general overview of gamification in MOOCs concerning what theories, strategies, elements, and techniques are used to date. Thus preliminary work for this study was laid by investigating relevant theories, strategies, and elements used in the setting of gamified and adaptive MOOCs.

The sources sought and used in this study partially covered the theories, strategies, and elements used. This article aims to do a synthetic work so that a recent article covers as much as possible of those that have been reported so far in the selected relevant literature on theories, strategies, and elements for gamified and adaptive gamified MOOCs.

The research prompted motivation and interest in searching for articles that would help MOOC researchers and practitioners have a more informed and global view on the foremost issues of theories, strategies, and elements for gamified and adaptive gamified MOOCs. Thus, a study was planned to address the issues mentioned above, and the following research question was posed explained below: What main theories, strategies, elements, and techniques are used in gamified and adaptive gamified MOOCs?

A thorough systematic literature review was used to research this question, the PICOS design was employed as a framework to create research questions and search strings, and the Prisma 2020 flow diagram was used to show the selection process of the most appropriate research articles.

This study might contribute to the findings of this research in using MOOC designers or developers for their MOOC design to avoid or minimize shortcomings and manage the challenges systematically. Moreover, they might use the corresponding report for general information on innovations of MOOCs on gamified MOOCs to highlight the role of theories, strategies, and elements in improving effectiveness in gamified and adaptive gamified MOOCs.

For the continuation of this article, it is important to mention a brief overview of the existing review papers. The articles mainly refer to terms related to gamified and adaptive gamified MOOCs in terms of gamification theories, strategies, elements, and related topics. Indicatively, various statistics are reported in <Table 3> and <Table 4>.

The remaining part of the article is structured

as follows. The second section reviews the literature on gamification in MOOCs, the third section covers the research methodology, the fourth section deals with the usefulness of the gamification theories, strategies, and elements used in MOOCs, the fifth section discusses research findings, and the sixth section offers a discussion of the study's findings and conclusions are drawn.

Ⅱ. Literature Review on Gamification in MOOCs

2.1. An Introduction to Gamification and Adaptive Gamification in MOOCs

A few years ago, MOOCs were developed showing a new way for distance education. However, several shortcomings and challenges for further improvement were quickly identified. Recently, gamified and adaptive gamified MOOCs have been developed to offer better quality and more accessible applications that increase the effectiveness of MOOCs by improving the disadvantages of traditional MOOCs.

Several researchers have dealt with the burning issues of MOOCs. Sonwalkar (2012) asserts that one major cause of concern is the significant number of students who enroll in MOOCs but dropout before finishing them (approximately 90%). According to Rohan et al. (2021), important challenges with MOOCs include a high dropout rate, a lack of learner motivation, and diverse MOOC users.

According to Niman (2014), learner engagement in course activities should be the primary yardstick for determining if a MOOC is effective rather than specific reported outcomes. According to Itani et al. (2018) research, the high dropout rate is caused by a lack of time, family obligations, a lack of online abilities, a lack of prior experience, the course's structure and difficulty, the poor quality of the lessons, and the pedagogical methods that have been used.

The factors that affect a MOOC's retention rate have been studied. Hone and Said (2016) looked into students' perspectives and found that course content in MOOCs was a thoroughly essential predictor of retention.

Chen and Zhang (2017) developed an online prediction method based on historical data that anticipates dropout intention from a MOOC by assuming that a student has dropped the course if they haven't participated in it for a few weeks. This approach aims to reduce dropouts.

According to Manal et al. (2018), the obstacles should emphasize how difficult it is to choose which gamification strategy to use, how adequate the information is for choosing gamification elements, and how important it is to manage the impact of gamification.

According to Arce and Valdivia (2020), the motivation and personal satisfaction of the students are significant factors to be considered when developing MOOCs. Kim (2015) believes that gamification in education is a very effective tool for improving students' attention and motivation to commit to a mission and influence their behavior. Gamification is frequently recommended for challenging activities because it has an approving impact on students' motivation, engagement, and satisfaction (Nurtanto et al., 2021).

Motivation is a critical factor for gamification, and according to Keller (2008), it is a theoretical notion that signifies human behavior and can lead to favorable cognitive outcomes such as improved learning and achievement. There is a fair relationship between gamification and motivational outcomes (Koivisto and Hamari, 2019).

Students' engagement is defined by the time, energy, thinking, effort, and feelings they keep in learning and is comprised of students' attitudes, thoughts, and behavior regarding knowledge (Lee et al., 2019). According to Pietarinen et al. (2014), there are three types of engagement behavioral, emotional, and cognitive. Research conducted by Cheung et al. (2018) showed that in the gamified MOOC, adding more cooperation elements during the learning process can increase learning motivation and enjoyment.

The incorporation of gamification into a MOOC course emerges to increase user participation and course completion rates (de Notaris et al., 2021). Recent research shows that gamification in MOOCs not only dramatically increases user enrollment but can improve user motivation, interaction, and overall performance, increasing user engagement throughout the study and collaboration between students (Chang and Wei, 2016), the completion rate (Nesterowicz et al., 2022), the user participation and retention on gamified MOOCs (de Freitas and da Silva, 2020) and enhance self-regulated learning engagement and learning outcomes, but only when the learners' traits correspond (Cheung et al., 2018).

Adaptive gamification in MOOCs tries to provide a better learner experience by leveraging educational content and adapting it to learners and context. As a result, it is critical to step back and consider how game elements can be adapted to learners in educational contexts (Hallifax et al., 2021). According to a study by Lavoué et al. (2019), learners with adapted gamification elements spend significantly more time in the learning environment than those without adapted gamification elements. Monterrat et al. (2014) suggested that gamification elements can be automatically adapted based on an appraisal of the interaction paths. The user model is initialized according to interaction paths and is eventually used to predict which gamification element will be relevant for the user.

Mbabu et al. (2019) agree that students' motivations differ depending on their preferences and learning styles. Thus, several learning styles are used to adapt gamification elements to learners in MOOCs. Learning adaptation, visualization, and gamification should be given more significant importance and emphasis as they have a high possibility for positive outcomes such as engagement, participation, social collaboration, and better performance (Maher et al., 2020).

Ⅲ. Methodology of Research

This work supplies a thorough review of the literature on gamification in MOOCs to guide researchers, designers, and developers in planning future gamified MOOCs to achieve significant efficiency over conventional MOOCs. Thus, MOOC designers or developers might use the findings of this research for their MOOC design to avoid or minimize shortcomings and manage the challenges systematically. Moreover, they might use the corresponding report for general information on innovations of MOOCs on gamified MOOCs. They may also be used for educational purposes.

To find the theories, strategies, elements, and techniques used by gamified MOOCs that increase their efficiency over conventional MOOCs, a thorough systematic literature review regarding this case was conducted.

The fundamental factors adopted for deciding which research methodology will be used are the factors of the gamified MOOCs that contribute to the enhancement of efficiency of conventional MOOCs, the learner traits they used, and the gamified

methods, strategies, elements, and adapting techniques that have been used for the improvement of the efficacy of conventional MOOCs.

Consequently, the foremost critical keys that have been used for the research question are gamification, gamification in MOOCs, gamified MOOCs, adaptive gamified MOOCs, and additionally theory, strategy, element, effectiveness, performance, engagement, dropout rate, retention, motivation, challenges, completion, and competence.

In the Scopus and Google Scholar databases, the PICOS design was employed as a framework to create research questions and search strings.

Taking into consideration the referred above, the following research question (RQ) was posed:

RQ1: What main theories, strategies, elements, and techniques are used in gamified and adaptive gamified MOOCs?

The «main» refers to those that have been used to date in at least one application of gamified and adaptive gamified MOOC within the sources studied. There may be other theories, strategies, elements, and techniques used in gamified and adaptive gamified MOOCs that are not indexed in the Google Scholar and Scopus engines used το search the sources.

The systematic literature review methodology was used to investigate the gamification methods, strategies, elements, and techniques from research on gamified and adaptive gamified MOOCs by searching the bibliography to answer the research question. Furthermore, as much research as possible was conducted to reduce inaccuracy, increase efficiency and reliability, and eliminate biases and errors. Prerequisites for the study include the selection of a bibliography and studies that meet the following inclusion and exclusion criteria.

Inclusion criteria: Peer-reviewed high-quality scientific journals and conference articles, as well as books about gamification in MOOCs with a significant number of citations or new essential research from 2011 to 2023; methodology, technology, procedure, and findings that address challenges or shortcomings of conventional MOOCs; selection of mainly primary studies to avoid population restrictions when considering the practical implications of the systematic review.

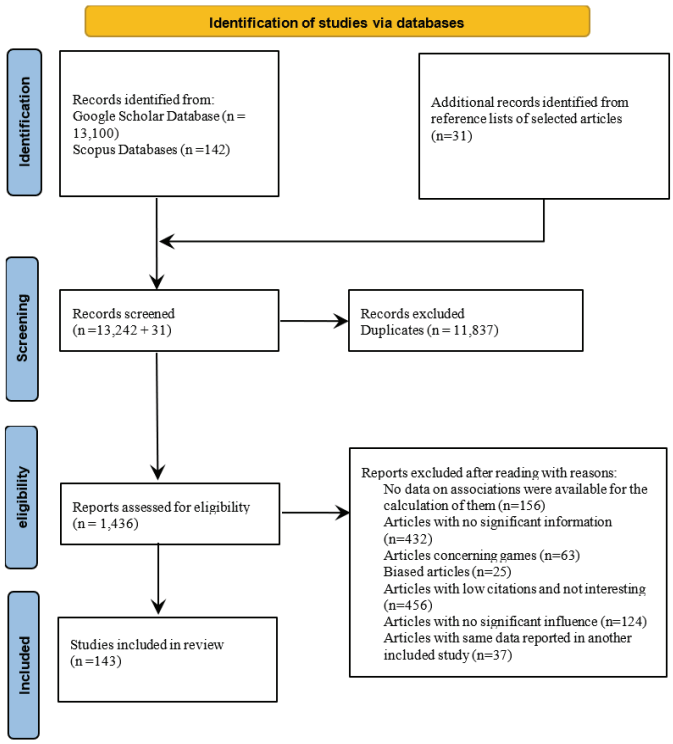
Exclusion criteria: Articles should be limited to English-language articles from 2011 to 2023, duplicates, articles in the non-MOOC context concerning gamification, and articles that do not meet the inclusion criteria.

Thus, the formulated search string was as follows:

(gamification OR gamified OR "adaptive gamification" OR "adaptive gamified") AND MOOC AND (theory OR strategy OR element OR effectiveness OR performance OR engagement OR dropout OR retention OR motivation OR challenges OR completion OR competence).

The papers were gathered from the Scopus and Google Scholar databases by the research objectives and the inclusion and exclusion criteria.

High-quality peer-reviewed scientific journals and conference articles, as well as books on gamification in MOOCs, mainly related to theories, strategies, and elements, with a significant number of references or new basic research from 2011 to 2023, findings addressing challenges or shortcomings of conventional MOOCs were chosen. Primary studies were selected to avoid population limitations when examining the practical implications of the systematic review.



<Figure 1> Prisma 2020 Flow Diagram for the Study

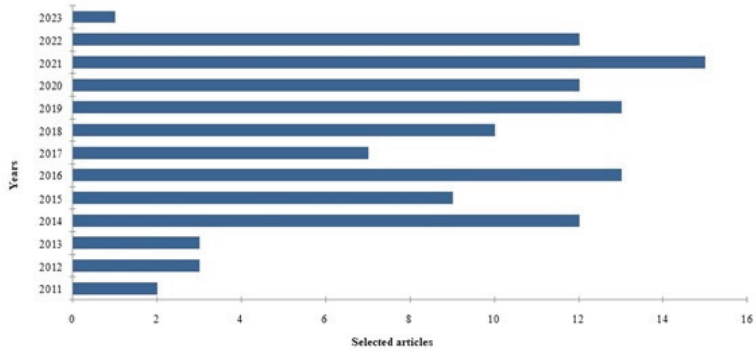
After reading, articles that met the inclusion criteria but did not include significant information were removed. Thus, at the eligibility stage, the articles were checked in the following cases: articles with no data on associations were available for the calculation, articles with no significant information, articles concerning games, articles with low citations and not interesting, articles with no significant influence, articles with same data reported in another included study. Furthermore, papers were evaluated for bias using the Cochrane RoB 2 tool (Excel version), and those found to be biased were not chosen.

The procedure followed for the selection of the most suitable articles is illustrated in the Prisma 2020 flow diagram below.

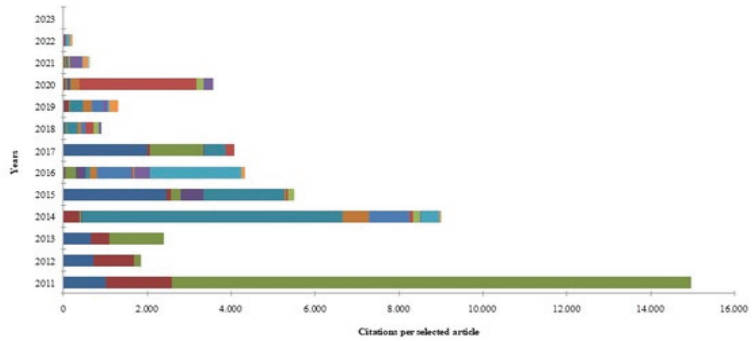
For the quality of research studied 143 bibliographic papers that reported empirical evidence concerning the theories, strategies, and elements of gamified and adaptive gamified MOOCs, and how they affect student performance, engagement, dropout rate, and other factors compared with conventional MOOCs. The main articles are 112, and the articles that have information about theories and are out of the years 2011 to 2023 are 31. The statistics of the selected articles related to gamification are as follows.

<Figure 2> shows that of the selected articles about gamification, almost half of them have been chosen from 2019 to 2022.

<Figure 3> shows that of the citations per selected articles about gamification from 2011 to 2023, more publications have been made in 2011 followed by 2014, 2015, 2016, 2017, and 2020.



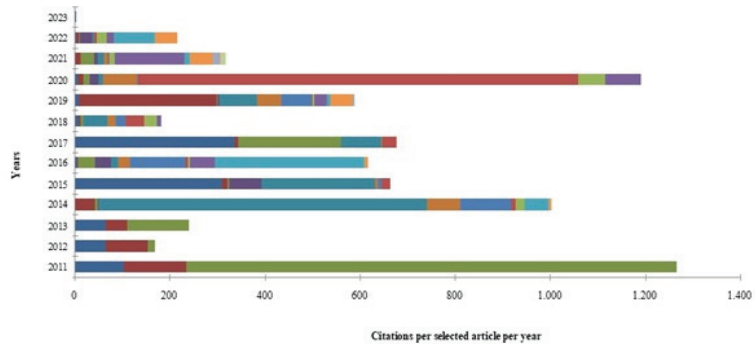
<Figure 2> Selected Articles Per Year



<Figure 3> Citations Per Selected Article

<Figure 4> compensates for the time of the citations per selected articles per year and provides a fairer comparison from <Figure 3>. Thus, for the the citations per selected articles per year about gamification for the period from 2011 to 2023, more citations per selected articles per year were made in 2011 followed by 2020, 2014, 2017, 2015, and 2016.

Regarding the quality of the journals, the majority of them with a high impact quality and prestige, are mentioned in <Table 1>.



<Figure 4> Citations per selected article Per Year

<Table 1> The Most Important Journals Used for the Research

Journal	H-index	Quantity
Lecture Notes in Computer Science	446	2
MIS Quarterly	257	3
American Psychologist	256	1
Psychological Review	230	1
Communications of the ACM	230	1
Computers	226	1
Computers in Human Behavior	226	5
Sensors (MDPI)	219	1
Computers and Education	215	2
Journal of Marketing Research	192	1
Information and Management	182	1
International Journal of Environmental Research and Public Health	167	1
Human Relations	152	1
International Journal of Information Management	152	1
International Journal of Human-Computer Studies	138	1
Sustainability	136	3
Medical Teacher	131	1
Journal of Systems and Software	123	1
Contemporary Educational Psychology	123	1
European Journal of Information Systems	119	1
Information and Software Technology	116	1
Public Opinion Quarterly	115	1
British Journal of Educational Technology	110	2
Educational Technology and Society	103	2
Journal of the Association for Information Systems	90	1
Social Science Computer Review	85	1
Management Learning	84	1
European Journal of Work and Organizational Psychology	84	1
Simulation and Gaming	67	2
Australasian Journal of Educational Technology	61	1
Education and Information Technologies	61	1
IEEE Transactions on Learning Technologies	58	1
Business and Information Systems Engineering	57	1
Interactive Learning Environments	57	1
Eurasia Journal of Mathematics, Science and Technology Education	50	1
International Journal of Educational Technology in Higher Education	49	1

<Table 1> The Most Important Journals Used for the Research (Cont.)

Journal	H-index	Quantity
International Journal of Emerging Technologies in Learning	39	1
Entertainment Computing	34	2
International Journal of Engineering and Technology	33	1
Frontiers in Education	29	1
International Journal of Innovation and Learning	29	1
SN Computer Science	25	1
Smart Learning Environments	24	1
International Journal of Game-Based Learning	22	1
International Journal of Information and Communication Technology Education	19	1
Journal of International Education in Business	17	1
Journal of University Teaching & Learning Practice	15	1
International Journal of Evaluation and Research in Education	14	1

Ⅳ. Gamification Theories, Strategies And Elements Used In MOOCs

4.1. Gamification Theories

Gamification strives to improve services with motivational affordances to call upon experiences and behavioral outcomes. The main features of gamification are motivational affordances, psychological outcomes, and behavioral outcomes. According to Hamari et al. (2014), gamification influences user motivation to use the system, which impacts psychological outcomes (like improved learning or enhanced attention), which then causes behavioral outcomes (like a higher performance).

Motivational affordances are the elements and rules that help create entertaining experiences in systems. The psychological effects of gamification are the feelings of competence, autonomy, and relatedness or enjoyment and engagement that are usually associated with it (Ryan and Deci, 2020). The behavioral outcomes of gamification relate to behaviors and activities enabled by taking on a gamification system. In gamification, motivational affordances come in the form of gamification elements, achievements, levels, challenges, etc. In theory, the motivational aspects of gamification are responsible for psychological outcomes (Lee et al., 2019)

Deterding et al. (2011) also proposed situated motivational affordances, which refer to the opportunities for satisfying motivational needs provided by the relationship between an artifact's features and a subject's skills in a particular event, including both the event and the artifact in its particular to the situation purpose and use (e.g., app and points system).

Various theories of gamification applied to MOOCs have been proposed and used. This article describes the most important and most used ones.

In *Gamified Learning Theory* (Landers, 2014), gamification does not directly affect learning but facilitates learning-related behavior or attitudes. These behaviors/attitudes, in turn, influence learning via one of two mechanisms: enhancing the link by a moderating process between instructional design quality and outcomes and/or by a mediating process directly affecting learning. To some extent, learn-

er-related behavior can be predicted based on how learners perceive, comprehend, and apply information. Landers and Callan (2012), in their studies on gamified learning theory, used gamification elements to encourage evident behavior and found that they improved academic performance. Gamified learning theory applies to methods that promote student engagement and motivation (Kapp, 2012). Zaric et al. (2021) based on gamified learning theory, indicated that gamification design positively adds to academic participation and affects learners' engagement in gamified environments, and students' learning inclinations mitigate their engagement.

The *Theory of Gamification Effectiveness* (Amir and Ralph, 2014) is based on existing studies in motivational psychology and digital game design. According to this theory, the efficiency of gamification is determined by the gamification mechanics (rules, user interaction, etc.) used and their effects on user intrinsic and extrinsic motivation and immersion, and if it offers the system use and the systems and users goals. Incorporating gamification into a system with a specified aim is beneficial. Integrating gamification into a system with a specific emphasis is helpful if it adds to that aim. To engage effectively with the gamified system, the software developer must receive and evaluate input and link the gamified system objective with the user's goals. Because antecedents are factors that influence gamification effectiveness, immersive dynamics are factors that influence a player's immersion in a gamified system or activity. Furthermore, intrinsic and extrinsic motivation contribute to the effectiveness of gamification.

The *Flow Theory*, known as the *theory of optimal experience* (Csikszentmihalyi, 1990) states that people are most engaged when they are in a state of flow or complete absorption in an activity. Flow is a state of thorough enjoyment and optimal experience characterized by intense concentration and engagement in an activity where a person is fully occupied with it and matches his/her skills that are neither too difficult to cause anxiety nor too easy to cause boredom. This theory is founded on the idea that the elements of enjoyment are generic, and it provides a general model that summarizes common concepts when anyone experiences happiness. Flow is one of the most influential psychological outcomes of gamification and games. Flow theory is one of the main theories related to engagement and gamification (Guo et al., 2016). Hamari et al. (2014) used flow theory to illustrate how gamification encourages engagement and how challenge and skill are the main variables that contribute to the overall flow experience. The study by Mulik et al. (2019) highlights the affective role of flow experience on MOOC adoption. MOOC satisfaction and its usage intention were discovered to be true to the outcomes of the flow experience. The study also found the mediating role of MOOC satisfaction in the relationship between flow experience and MOOC usage intention. Flow is critical for keeping people engaged and eventually allowing them to complete the task. According to Vann (2020), by experiencing flow elements such as losing track of time and having enhanced focus, users can have a higher level of engagement due to the gamified characteristics. The flow element challenge is the most responsible for increasing or decreasing user motivation (Cezarotto and Battaiola, 2016).

The *Self-Determination Theory* (Ryan and Deci, 2020) is the most commonly used theory in gamification that explains motivational behavior and human needs. In different contexts, gamified systems may produce different behavioral outcomes. This theory is a comprehensive obligatory supporting theory in gamification for understanding the prospect of games and gamification in motivation. It is considered the

principle framework for the study of intrinsic motivation which is often assessed behaviorally through activities and experientially through questionnaires that investigate the reasons for a person's engagement with activities and exceptional affective circumstances such as interest, curiosity, and fun. Martin et al. (2018) demonstrated the value of a design framework based on self-determination theory in the creation of MOOCs that successfully engage learners by fostering intrinsic motivation, optimizing engagement, and improving the retention of course participants. Salikhova et al. (2021) used self-determination theory in an online course study, where learners reported that online courses provided the most opportunities to satisfy the need for autonomy, with adequate support for competence; however, they worked hard to satisfy the relatedness need.

The *Relationship Quality Theory* (Morgan and Hunt, 1994) is extensively utilized to reflect long-term relationship exchange. Trust and commitment are crucial elements of a high-quality relationship and have been proven necessary in online environments (Morgan and Hunt, 1994). Relationships, satisfaction, mutual goals, cooperative norms, mutual respect, trust, honesty, compromise, individuality, good communication, and anger control are some additional characteristics found (Sun et al., 2019). During the interaction process, a relationship is formed between students and other participants, as well as the MOOC platform in which student learning is stimulated by a close relationship with other learners and the MOOC platform (Diep et al., 2016).

Research by Sun et al. (2019) based on self-determination theory and the theory of relationship quality showed that the fulfillment of three core psychological demands for autonomy, competence, and relatedness has considerable positive effects on intrinsic motivation, improving students' psychological engagement in MOOCs. The quality of relationships indicates students' psychological involvement, which enhances behavioral engagement in MOOCs. Relationship trust and commitment are significant determinants of students' psychological participation in MOOCs.

The argument is a significant notion in philosophy. *Argumentation theory* (Lewinski and Mohammed, 2016) looks into the methods and norms for employing arguments. They define argumentation as a communicative activity involving the creation and exchange of reasoning in a setting of doubt or disagreement. Argumentation theory combines a descriptive examination of how we argue with a normative investigation into the standards of excellent argumentation. As a result, it has a strong multidisciplinary legacy that extends from classical rhetoric, dialectic, and logic to domains like online communication and artificial intelligence.

The *Self-efficacy Theory* (Bandura, 1982) suggests that self-efficacy can impact anything and specifies how we will achieve the goals we formed and reflect on our performance. Self-Efficacy is a person's particular set of beliefs in their ability that determine how well can execute a plan of action to succeed in a particular situation (Bandura, 1982). Self-efficacy theory posits that self-efficacy can have a bearing on any goal, and it determines how we will reach our aims and appraise our progress. Banfield and Wilkerson's (2014) research uncovered that gamification helps foster stronger intrinsic motivation and self-efficacy among students. Furthermore, self-efficacy and gamification affect either motivation or involvement, or both. As such, when employing gamification, self-efficacy influences either motivation or engagement, or both.

The *Goal-Setting Theory* (Locke and Latham, 2002) states that setting defined and measurable goals is more effective than setting undefined ones. This

idea provides a clear framework for setting and achieving goals effectively. It provides regular constructive feedback, ensuring that participants are continually improving. There are five major aspects of defining effective goals, according to goal-setting theory: clarity, challenge, commitment, feedback, and task complexity. Landers et al. (2017) regarded that badges and levels could be used to implement goal setting. According to Richter et al. (2015), goal-setting can help explain the role of gamification points, leaderboards, rewards, challenges, achievements, badges, virtual goods, quests, and levels. The four main elements of the goal-setting theory of motivation are goals, challenges, feedback, and customization (Locke and Latham, 2002).

The *Uses and Gratifications Theory* (Katz et al., 1974) deals with understanding why people use certain types of media, what needs they have to use them, and what gratifications they get from using them. This theory emphasizes motives and the self-perceived needs of audience members. It explains how people use media to meet their needs and feel satisfied when they are fulfilled. People have various needs and gratification. These may be classified into five categories: cognitive, affective, individual, social, and freedom. Gamification requires some pre-existing seek-out uses and gratifications, yet it may indirectly promote these (van Roy et al., 2018).

Another theory used in gamification is Vygotsky's *Social Constructivism Theory Concerning Scaffolding*. Rohman and Fauziati (2022) suggest that the appliance of gamification in educational media can be understood through Vygotsky's social constructivism theory concerning scaffolding. According to Vygotsky, scaffolding is mentioned to assist students in attaining higher levels of competence through teacher support. When students gain background in solving problems by themselves, the teacher gradually reduces guidance. If a learner is incompetent to continue in a gamified environment, providing hints and clues is a way to incorporate scaffolding. Another method is to gradually reduce the frequency and availability of hints and clues as learners become more competent or provide a way for learners to narrow their choices of answers.

The *Cognitive Evaluation Theory* (Deci and Ryan, 1985) explains how external consequences affect intrinsic motivation. Hence, the impact of an event on motivational processes is defined not by the objective aspects of the event but rather by its psychological significance for the individual. According to the cognitive evaluation theory, both competence and autonomy satisfactions are required to sustain intrinsic motivation. Moreover, the perceived focus of cause and perceived competence describe a person's experience with an activity rather than environmental properties. They reflect the way an individual organizes reality. Similarly, an event perceived as informative, controlling, or motivating is a function of the relative meaning of these characteristics to the perceiver, influenced by their sensitivities, background, agendas, and the event's actual configuration. Hsu (2022) investigated the impact of gamification mechanics that lead to the need for satisfaction to develop intrinsic motivations by using cognitive evaluation theory. Gamification is expected to assist the pleasure of psychological demands through methods such as self-expression, point rewards, and competitiveness, in addition to creating intrinsic motivation.

The *Achievement Goal Theory* (Nicholls, 1984) focuses on the type of motivation that occurs in achievement settings, namely students' constructions of the meaning of success and, as a result, the objectives they intend to achieve. This theory is divided into goal orientation and goal structure. Moreover,

this argues that goal structures can influence learning, engagement, and achievement. According to achievement goal theory, when undertaking achievement-related tasks, people's levels of involvement focused toward task or ego goals can change. That is, they can be more or less task- and ego-involved, at any point of task involvement. Thus, they are interested in how people with high task/high ego, high task/low ego, low task/high ego, and low task/low ego create goals, process goal-related feedback, and the relevant motivational procedures and resulting actions. Tang and Zhang (2019) used achievement goal theory in a gamification setting and identified three sets of achievement goals, including cognitive ability, social competence, and social purpose. Antonaci et al. (2019) used gamified online learning settings so that users improve goal achievement.

The *Social Comparison Theory* (Festinger, 1954) outlines the comparative processes people use to evaluate their actions, accomplishments, opinions, attitudes, abilities, and traits to compare to others. People compare themselves to one another to estimate how they rank compared to others with the aim of self-evaluation, self-enhancement, and self-improvement. People who want to improve compare themselves to others who are better, while those who want to feel better about themselves compare themselves to those who are worse. People's perceptions of themselves are influenced by social comparison, as is their behavior. Huschens et al. (2019) found that adding a ranking gamification element increases motivation, perceived pressure, and social comparison behavior. They also discovered that the level of an individual's social comparison behavior can explain a considerable portion of the motivational and pressure effects. In particular, gamification elements based on rankings and leaderboards create transparency among users, which allows for interpersonal social comparison. Moreover, social gamification elements may enable social comparison and connect people to support and collaborate on a similar aim (Krath et al., 2021).

The *Social Presence Theory* (Short et al., 1976) investigates how digital interfaces influence the sensation of being with another in human-computer interactions. According to Short et al. (1976), the two most important aspects of social presence are intimacy and immediacy. These two notions are closely related; intimacy relates to the sense of togetherness that communicators experience throughout the contact, while immediacy refers to the psychological distance between the communicators. Social presence is regarded to be particularly important in virtual contexts with social participants, where it affects social influence. Theories of social presence are being used to explain how students and teachers interact and learn online. Users in an online shared environment may feel more involved if they regard others as real humans and have a sense of belonging to a community (Antonaci et al., 2019). Antonaci et al. (2019) found that using social presence and sense of community theories in gamification design in a MOOC positively impacts users' development of social presence and sense of community, as well as their learning performance, but did not establish that higher degrees of social presence and sense of community were associated with higher levels of MOOC user engagement.

The *Theory of Planned Behavior* (Ajzen, 1991) anticipates behaviors over which individuals have limited voluntary control and extends the concept of perceived behavioral control by accounting for self-esteem and self-efficacy. This theory is intended to predict and explain unique human behaviors. A person who is highly motivated to undertake the behavior may fail to do so due to intervening environ-

mental factors. Environmental factors may have an impact on supplement use. Schettino and Capone (2022) applied the Theory of Planned Behavior and revealed that students' sentiments regarding the course and their intention to attend it are connected to the perceived utility and simplicity of use of a MOOC. As a result, it is critical to pay attention to specific demands and learning styles that can influence the efficiency of MOOCs.

The *Motivational Affordances Theory* (Zhang, 2008) considers that perceived affordances increase user motivation for technology usage, and correctly transmitting technology affordances is critical to facilitating user motivation for its maintenance. According to Zhang (2008), motivational affordances, are characteristics of an object that determine if and how it may satisfy one's motivational needs. As a result, technologies that encourage user motivation should be built so that the technological features generate appropriate affordances to meet the demands and goals of users. According to Tang and Zhang (2019), using the motivational affordances approach may result in gamified technology that meets the diverse needs of users.

The *Technology Acceptance Model theory* (Davis, 1989) is one of the more commonly used theoretical models, with two principal elements influencing an individual's decision to utilize new technology: perceived ease of use and perceived utility. The technology acceptance model is the most widely used, tested, and operational approach for explaining course management system utilization and satisfaction with the Internet as an educational delivery medium (Arbaugh and Duray, 2002). According to Tao et al. (2022), perceived ease of use, perceived usefulness, and perceived enjoyment all have a consequential effect on students' behavioral intention to use MOOCs, while perceived usefulness and behavioral intention have a considerable impact on the perceived usage of MOOCs.

The *Technology-Enhanced Training Effectiveness Model theory* (Landers and Callan, 2012) was created to fill inadequacies in existing educational efficiency models for describing the efficacy of technology-enhanced learning in settings like gamification or virtual worlds. The concrete model supports that teaching inputs such as the work environment, student characteristics, and instruction design influence learning outputs, such as reactions and learning, which, in turn, influence the transfer of learning outcomes, such as behavioral change and organizational results. This model focuses mainly on the distal effects of attitudes toward certain technologies (e.g., gamification or virtual worlds), experience with those technologies, and the work environment for those technologies on different learning outcomes along these channels. Landers and Armstrong (2017) provide empirical evidence for Technology-Enhanced Training Effectiveness Model theory and argue that for gamification to be successful, participants' attitudes and experiences must be analyzed and ensured before implementation.

The *Unified Theory of Acceptance and Use of Technology* (Venkatesh et al., 2016) investigates technological acceptability as determined by the influences of performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the degree to which people believe technology will improve their performance. The degree of ease with which the technological system can be used is called effort expectancy. The degree to which individuals believe that significant others accept they should use the new technology systems is known as social influence. The degree to which individuals perceive that an organization's technical infrastructure exists to facilitate the use

of a technology system is referred to as facilitate conditions. Based on the unified theory of technology acceptance and use, Ng et al. (2022) conducted experiments on the Online Gamification Learning Platform (OGLP) and the results showed that all technology acceptance factors (performance expectancy, social influence, facilitating conditions, perceived playfulness) except effort expectancy have an essential impact on behavioral intention toward the OGLP. Altalhi (2021) explored a study on MOOCs based on the unified theory of technology acceptance and use. The findings revealed that the acceptance of MOOCs was significantly influenced by their performance expectancy, effort expectancy, social influence, self-efficiency, attitude, and facilitating factors.

The *Operant Conditioning Theory* (Skinner, 1938) is an acceptable motivating theory for explaining the concept of gamification. Skinner felt that we indeed have a mind but that studying observable behavior rather than interior mental occurrences is more effective. Thus, the best way to understand behavior is to examine the causes and consequences of an action. This method was dubbed operant conditioning by him. Although Skinner is regarded as the father of operant conditioning, his work was founded on Thorndike's law of effect. Skinner's addition to the Law of Effect was reinforcing. Reinforced behavior is more likely to be reproduced (i.e., strengthened), whereas unreinforced activity is more likely to pass away or be eliminated. Positive reinforcement strengthens behavior with a reward.

The *Expectation Confirmation Theory* (Oliver, 1980) is a cognitive theory that claims that expectations, when combined with perceived performance, result in pleasure. Positive or negative confirmation between expectations and performance mediates this effect. The model's four primary constructs are expectations, performance, confirmation, and satisfaction. Based on the principle of expectation confirmation, Feng et al. (2019) showed that social and immersive gamification components positively affect expectation confirmation and perceived usefulness, and the result is strengthened user satisfaction and retention volition. According to the findings of the Gu et al. (2021) study, the information quality, system quality, and service quality of MOOC platforms all have an impact on expectation confirmation, with service quality having a substantial influence and perceived usefulness and user satisfaction are the most significant factors influencing users' continuance intention in using MOOC platforms.

The *Task-Technology Fit Theory* (Goodhue and Thompson, 1995) assesses how much technology helps human being carry out their responsibilities. Technology should be used to achieve good individual output impact from an information system; additionally, The tasks supported by the technology must be well-matched. The Task Technology Fit theory is based on the concept that when the user task characteristics and the information system features are well-aligned, the system use and user performance will be excellent. Goodhue and Thompson (1995) developed a metric that includes eight components: quality, localizability, compatibility, authorization, simplicity of use, system dependability, production timeliness, and user relationship. Vanduhe et al. (2020) support that Task-Technology Fit helps explain and predict how user acceptance is related to gamification. Task technology fit, confirmation, and perceived value, according to Shanshan and Wenfei (2022), are expected to facilitate the utilizing experience and increase trust and enjoyment. A study by Kim and Song (2021) concerning the use of task-technology fit theory on MOOCs confirmed the mediating role of perceived usefulness and perceived ease of use on the relationships between teaching presence

and task-technology fit and users' continuance intention in using MOOCs.

4.2. Gamification Strategies

Gamification strategies and elements can be used as a supplement to existing learning methods to help students learn more effectively. A gamification strategy is an intentional method for using gamification techniques to achieve particular objectives. Gamification strategies are widely used in higher education, particularly in distance education, to boost student motivation and engagement in a learning activity (Chans and Portuguez, 2021). According to Beer et al. (2010), regardless of how student engagement is promoted in gamification environments, it should be based on educational motivations. Engaging students in gamified learning activities can result in improved learning outcomes. Alternative grading systems, such as those used in games, can motivate students and promote higher-order thinking skills or critical and creative thinking (Zhao, 2019).

According to Kiryakova et al. (2014), many factors must be considered while developing a strategy for introducing gamification in a MOOC, including learner characteristics, course objectives, the creation of educational content and activities, the addition of game strategies and mechanics, and the appropriate software. Moreover, they suggest that the main steps of an effective strategy for the implementation of gamification should include a) the determination of learners' characteristics, b) the definition of learning objectives, c) the creation of educational content and activities for gamification, and d) adding game elements and mechanisms.

The popular gamification design elements, according to Dicheva et al. (2015), involve goals and challenges, personalization, rapid and visible feedback, freedom of choice and freedom of failure, as well as social engagement. Additionally, adopting gamification strategies in MOOCs may be a viable solution to the high dropout rate of MOOC users. Rizzardini et al. (2016) proposed incorporating gamification elements into a conceptual model for MOOCs to reduce dropout rates.

Gamification strategies are critical for learning activities because they use traditional game concepts like points or badges to encourage consistent participation and long-term engagement while providing users immediate feedback on what actions will be rewarded later. A successful gamification strategy should include elements that let learners participate in assignments that draw from their strengths and motivate them to achieve objectives quicker and more effectively. A gamification strategy employs gaming techniques to boost participation, engagement, and other characteristics in an existing system, such as a software application or web community. A gamification strategy must be aligned with educational goals (Seixas et al., 2016).

It was noted by Caballé and Clarisó (2016) that no single gamification approach is successful for all users and that each gamification experience should be designed with the user's needs at its core. They believe that gamification elements are potent instruments that can be employed in numerous educational activities, and MOOCs are no exception.

Gamification strategies offer students novel opportunities to develop critical thinking skills, social skills, and trained competencies (Souza et al., 2018). According to Nicholson (2015), gamification can be used in educational activities to create intrinsic motivation to obtain learning while satisfying the three psychological requirements of autonomy, competence, and relatedness. According to Prakash and Rao (2015), gamification strategies have just begun

to be utilized in training and education projects.

According to Huang and Hew (2015), gamification strategies aligned with educational goals and user environment effectively improve learner engagement and encourage extracurricular learning. Deep learning gamification strategies associated with educational aims and user environment significantly promote learner engagement and stimulate extracurricular learning in MOOCs (Borrás-Gené et al., 2014).

Various gamification strategies have been used so far, including the best-known and most used ones like challenge-based (achievement-based or reward-based), immersive-based, social-based, and goal-based.

The *challenge-based gamification strategy* (Koivisto and Hamari, 2019) focuses on overcoming challenges with rewards that are the principal game design elements, such as badges, levels, challenges, points, and leaderboards. Challenge-based gamification is a design strategy that incorporates achievement gamification elements that are positively related to intrinsic needs in an educational product or application to investigate its potential, motivate users, and ultimately improve learning. Challenge-based gamification increases students' learning outcomes, increasing our understanding of the impact of challenge-based gamification on education and eventual gamification pedagogy (Legaki et al., 2020).

The *immersive-based gamification strategy* (Concannon et al., 2019) aims to immerse the user in a narrative, roleplay, and audiovisual richness and links to a sense of creative freedom. Virtual reality (VR) is one immersive gamified intervention method that has been found to improve learning outcomes and motivation (Wu et al., 2020).

The *social-based gamification strategy* (Romero, 2017) promotes the development of both competitive and collaborative strategies and also attempts to immerse the user into a story and is characterized by its audiovisual richness. Social-based gamification was classified as intrinsic and extrinsic due to the nature of certain social activities. The social-based strategy operates as a supporter of either intrinsic motivation or extrinsic motivation. A social learning environment built by Simões et al. (2013) supports content and allows the instructor to select the proper social gamification tools to promote specific desirable behaviors, which are based on game-like elements. These actions are designed to increase learning results. The teacher can create badges or trophies for students to display in their profiles on the private social network, allowing them to share their accomplishments with peers, friends, family, or other teachers.

The *goal-based gamification strategy* (Cho et al., 2021) could target intrinsic motivation because it may affect mastery and skill improvement to motivate individuals' desire to seek challenges and extend their physical and psychological capacities. Most goal-based gamification strategies have goal setting and self-monitoring. Gamified wearable fitness trackers help people gain competency in concrete knowledge and abilities by utilizing a goal-setting process. Most of the research evaluated used goal-based gamification to motivate participants to use wearable fitness trackers. Users of gamified wearable fitness trackers constantly self-monitor their progress and results.

The *attention-based gamification strategy* (Hocine, 2021) is based on students' temporal attention and real-time interaction with online learning resources using gamification elements such as trophies, progression bars, and avatars. The study results showed that the students were satisfied with the gamified MOOC and that the proposed strategy increased their participation in forums (Hocine, 2021).

The *persuasive-based gamification strategy* (Orji et al., 2018) outlines the appropriate persuasive techniques for the study and meets the needs of the target individuals. Persuasive-based gamified systems are robust instruments for inspiring behavior change by using diverse persuasive methods and improving their efficacy by determining the user's responsiveness to persuasive approaches depending on their user type.

The *competitive-based gamification strategy* (Johnson et al., 1985) does not inspire all learning types and can lead to student frustration instead of motivation. Studies comparing competitive, individual, and cooperative learning strategies show that collaborative approaches produce the best results. Amo et al. (2020) studied how leaderboards enhance users' competitive traits about engagement and performance. They concluded that competitive individuals are more likely to employ and enjoy such a gamification element.

The *story-based gamification strategy* (Guerrero and Kalmi, 2022) utilizes formal argumentation theory to explain the software's functionality and user engagement. The brain processes stories faster than it does collections of facts. Gamification benefited greatly from using the story-telling method because gamified systems usually include story-telling features such as characters, narrative twists, and more (Guerrero and Kalmi, 2022).

The *progression-based gamification strategy* (Kapp, 2012) aims to show learners' progress as they master desirable knowledge, abilities, or behaviors with corresponding gamification elements such as progress bars, steps, maps, graphs, points/badges, etc. The questions in progression-based gamification are relevant to the material, and as the learner adequately answers those questions, they advance toward the goal of the gamified experience. When students answer questions, they proceed toward a gamification-type goal, such as unlocking the final level. When a learner answers a question incorrectly, they typically receive feedback within that experience so that the question can be answered correctly the next time it is encountered.

The *card-based gamification strategy* (Sobrino-Duque et al., 2022) influences the learning of Jakob Nielsen's ten heuristic usability criteria and is based on cards developed by Ferro et al. (2014). When applying this gamification method, there are two primary options: (1) employing a general-purpose gamification platform, or (2) developing self-built solutions to support gamification. To apply this gamification strategy, we should consider all critical factors such as game features, mechanics, user type, context, and motivation.

The *service-based gamification strategy* (Blohm and Leimeister, 2013) brings together a variety of sources. These gamified service bundles are organized into a central subscription based on specified practice outcomes and a gamification layer founded on gamification design elements. The framework is intended to demonstrate how gamification might use internal and extrinsic motivators to effect behavioral change and rethink activities such as learning.

The *theory-based (multi-component) gamification strategy* (Peña et al., 2020) is a new strategy to enhance motivation and engagement in beneficial behavioral changes. Authors to avoid childhood obesity in their Juntos Santiago study achieved superior outcomes in terms of many medical factors such as blood pressure by employing a multi-component gamification strategy. The multi-component intervention consisted of four parts: (i) healthy challenges; (ii) gamification incentives such as points, levels, leaderboards, and badges; (iii) rewards; and (iv) an online platform for parents and children to track

progress.

The *AR-based gamification strategy* (Reitz et al., 2016) allows for reproducing real-world scenarios, resulting in both pleasant and authentic training environments. Creating an AR-based app gamification approach will enable you to retain users for more distant extended periods while also developing a more reliable and diverse user experience. Using augmented reality we can help create a more appealing and result-oriented approach that drives gamification into the real world. To be successful, we must employ some of the best practices when developing an AR-based gamification strategy.

The *guided discovery-based gamification strategy* (El-Magd, 2017) is an inductive and deductive teaching technique in that the teacher incorporates suitable gamification aspects into illustrations, examples, and resources while engaging students in task performance for application and extra practice to improve their learning and enjoyment. This begins with the development of intended learning outcomes. This concept is followed by three major phases of guided discovery, each with gamification aspects. The gamified experience is structured as follows: formulation of intended learning outcomes, exposure, elicitation, and application, with three difficulty levels in between.

The *team-based gamification strategy* (Guido et al., 2004) can give learners a secure environment in which they can experience their learning efforts contributing to the wider purpose. The team-based gamified learning experience influences participants' attitudes toward and perceptions of gamified learning. Challenges, points, peer feedback, voting, and inter-team competition are typical game components utilized for team-based gamified learning experiences. Students' views about gamified learning, online collaboration, and competition are influenced by team-based gamified learning. Fun and enjoyment, motivation, engagement, relevance, and choice and freedom are the primary aspects that contribute to positive change. Team effectiveness is also favorably associated with implementing team-based rewards as an operationalization of outcome interdependence.

According to the research contacted by Rohan et al. (2021), the challenge-based (achievement-based) strategy has the most distinguished impact on motivation among gamification strategies, followed by the social strategy. Cheng (2022) found that the first three types of gamification strategies (challenge-based, immersive-based and social-based), positively affect learners' internal experiences by standing through MOOC, such as cognitive involvement, flow experience, and social presence.

4.3. Gamification Elements

MOOCs have evolved quickly and become quite popular thanks to the gamification elements and techniques they use. The concept of elements permits us to differentiate gamification from serious games, which are full games intended to serve a specific, non-entertainment purpose (Deterding et al., 2011). Through various elements (such as points, badges, levels, etc.) and techniques (such as engagement and activity loops, juicy feedback, storytelling, etc.) players are motivated to solve problems and sustain their interest. Motivating, providing feedback, and taking action are all components of an engagement loop. It is also possible for game design techniques to affect the response of a player's curiosity in a specific situation. In the design of gamification, such elements and techniques must be identified and adapted according to their purpose (e.g., increasing loyalty, engagement, and retention) and application context (e.g., environment, theme, user profile) (Simões et al., 2013).

Helmefalk et al. (2020) are worried that the gamification elements do not directly tackle the core needs of participants and proposed the utilization in a more theory-based way and that of game mechanics outside of the regularly observed points, badges, and leaderboards should be investigated to give the intrinsically motivating gamification experience. According to Mohamad et al. (2018) research, plenty of participants prefer to receive rewards during the learning process, followed by level, avatar, and points. Whitton and Moseley (2014) suggested that the use of gamification elements would increase motivation and might improve learning outcomes.

The main elements, techniques and rewarded systems of gamification that can be incorporated into a gamified MOOC are shown in <Table 2>.

Furthermore, Dicheva et al. (2015) propose a virtual currency of exchange established in a virtual community in MOOCs, as well as narratives that

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs

Elements, Techniques and Rewarded Systems	Description	References
Points	Numeric success indicators are used to keep score, determine levels, unlock rewards, and determine the winner. There are some kinds of points such as experience, status, redeemable, gift, reputation, and expiring.	Chou (2019); Dicheva et al. (2015); Kim (2015); Marczewski (2015); Wang et al. (2022)
Leaderboards	Display player scores, which are frequently determined by the number of points earned in a gamified MOOC and can be used to compare the progress of individuals within a group.	Chou (2019); Marczewski (2015); Wang et al. (2022)
Badges/Acknowledgement/Achievements.	It is a kind of extrinsic feedback that praises the players' specific set of actions. Represent larger achievements like finishing a unit, completing a series of related activities, or learning a new skill, or more abstract accomplishments like teamwork.	Antonaci et al. (2018); Chou (2019); Huang and Hew (2015); Marczewski (2015); Wang et al. (2022)
Rewards or Incentives/Prizes	Points and levels are earned rewards in the gamified MOOC.	Chou (2019); Huang and Hew (2015); Marczewski (2015)
Challenges	This substantial element is related to psychology through the concept of flow since only when the challenge of gamification fits within the flow parameters will it be enjoyable, otherwise, it will be frustrating or boring. This is an effective motivator for users in taking expected actions, complete a task, and progress in their learning processes, collaborative efforts, and interaction.	Kapp (2012); Kim (2015); Marczewski (2015); Wang et al. (2022)
Levels	It is one of the most significant user incentives. A higher level is usually associated with more valuable rewards. There are two kinds of levels: a) game level of challenges within the game based on their complexity, and b) player level of each player based on obtained skills and experience within the game.	Antonaci et al. (2018); Dicheva et al. (2015); Kim (2015)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Karma points	This is an automatic point system for rating a player's proper or improper behavior, ranking him, and motivating him to complete objectives. When activities are completed, the player earns Karma points; when they are postponed, the player loses Karma points.	Navío-Marco and Solórzano-García (2021)
Trophies	They are another form of reward for something users have achieved, like solving a level or overcoming a challenge.	Hocine (2021); Simões et al. (2013)
Certificate	A certificate is an actual representation of knowledge and attainment. It's an official identification given to those who have accomplished a significant feat or learned a specific skill.	Kiryakova et al. (2014)
Reputation	It is also known as classification or status and differs from level. It corresponds to titles that learners may gain and collect in an activity.	Chou (2019)
Teams/Guilds	People who work as a team to achieve common goals and objectives.	Marczewski (2015)
Social Discovery	Allowing people to find someone or providing opportunities for people to connect with others is a great way to build new relationships.	Marczewski (2015)
Social networks	Gamification activities in social networks can include new content, feedback, and more. Social networks can also foster a collaborative environment, which improves game quality for all participants.	Chou (2019); Marczewski (2015)
Social pressure	It is also known as peer pressure and is connected to social interactions that exert stress on the learner. It can affect the behavior of a learner founded on the behaviors of others. Some people are influenced by other people, while others are influenced by teams.	Chou (2019); Marczewski (2015)
Competitions	It is an intrinsic view connected to a challenge where the learner confronts another learner to achieve a common goal. Some users in MOOCs compete to complete each learning unit, while others compete in problem-solving and idea-generation activities. We can increase motivation and productivity while enticing team members to collaborate and work together successfully by encouraging one team to compete against the other.	Antonaci et al. (2018); Chou (2019); Dicheva et al. (2015); Marczewski (2015); Wang et al. (2022)
Unpredictability and Curiosity	Users are kept intrigued by unpredictability and curiosity, which keeps them in readiness to learn even more. Curiosity is regarded as one of the most crucial stimuli to school achievement because it has been related to enhancing not only interest but also the retention of information.	Chou (2019); Marczewski (2015)
Sensation	This is a visual or sound stimulus, etc., and is affiliated with the use of learners' senses to enhance the experience.	Toda et al. (2019)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Epic Meaning	This is a feeling of higher significance. We feel belonging to something higher than ourselves when we use epic meaning. We experience it when we are collaborating to achieve a common aim of improvement or to accomplish something for the greater benefit.	Chou (2019)
Flow	It is critical for keeping users engaged, which is important for MOOCs.	Marczewski (2015)
Storytelling	It is the way the story of the environment is told usually as a script. It is narration through text, voice, or sensorial resources.	Antonaci et al. (2018); Chou (2019); Dicheva et al. (2015); Kapp (2012); Kim (2015)
Scarcity and Impatience	They elicit an emotional reaction that makes it difficult for people to resist wanting things that are difficult to find or obtain. It heightens the fear of loss.	Chou (2019); Marczewski (2015)
Sharing Knowledge / Cooperation	Allow cooperative users to share their knowledge by giving answers to queries or teaching others. The best approach for anyone to retain information over time is to teach others. For some, assisting others by sharing their knowledge is its own reward. Develop people's capacity to answer questions and teach others.	Dicheva et al. (2015); Marczewski (2015)
Communication channels	They usually include traditional SMS and Email channels.	Antonaci et al. (2018)
Instant feedback	Giving people instant feedback will keep them constantly informed that they are on the right path and that they are progressing forward toward their goals and objectives.	Chou (2019)
Meaningful stories	Incorporating a meaningful narrative story into gamification provides context to the activities and characters involved, giving them significance beyond simply earning points or rewards. They do not affect users' performance.	Monterrat et al. (2014)
Collective responsibility	It is used in team activities to encourage students to keep learning. The team is held responsible as a whole for achieving the same goal and meeting the same standards, regardless of each member's personal skills or qualifications	Kim (2015)
Content unlocking	Users who earn a certain number of points can gain access to advanced modules.	Dicheva et al. (2015); Marczewski (2015)
Virtual goods	These are items that are purchased or traded in order to generate income for free play.	Chang and Wei (2016); Dicheva et al. (2015); Wang et al. (2022)
Notifications	They encourage user engagement when they perform a desired action while not interfering with the main functionality or appearing arbitrarily during task processes.	Toda et al. (2019)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Ranking	Learners are placed in a race against other learners and their final position in the race is determined by the number of questions they answered correctly.	Chou (2019); Hamari et al. (2014); Huang and Hew (2015); Landers et al. (2017); Marczewski (2015);
Avatars	In an app, a virtual persona is a representation of a user. This fosters an emotional connection between the user and their virtual persona by making them feel as though they have ownership of the avatar.	Chou (2019); Dicheva et al. (2015); Kapp (2012); Kim (2015)
Voting	Rating other players' actions. When the members of a group are required to decide on anything, then this is also done in gamification through voting.	Marczewski (2015)
Quests	A quest is a form of learning framework consisting of a series of tasks or challenges that must be completed. By breaking down the learning journey into smaller, manageable chunks, learners may focus on one step at a time and feel a sense of fulfillment when each quest is completed.	Antonaci et al. (2018); Chou (2019); Kapp (2012); Marczewski (2015)
Customization or Personalization	Gives people the tools to customize their experience. This allows them to say something about themselves and pick how they will exhibit themselves to others, from avatars to the world around them.	Chou (2019); Locke and Latham (2002); Marczewski (2015); Wang et al. (2022)
Visible status	The notion of visible status can be realized by using a leaderboard, badges, and so forth. A leaderboard, for example, may implement visible status and social interaction.	Dicheva et al. (2015)
Anarchy	In some cases, we need to erase everything we've done and start over. This element makes rules that are temporary disappear.	Marczewski (2015)
Emotion	This may be a strong learning tool that aids in the more effective encoding and retrieval of information, making the learning process considerably more efficient. Gamification fosters an emotional bond between the course content and the students. This has a strong effect on people's attention, making them more susceptible to learning.	Prakash and Rao (2015)
High five	This is a virtual statement or notice of appreciation provided to users after completing something significant.	Chou (2019)
Loss and Avoidance	This refers to the motivation that comes from the fear of either losing something you have or an opportunity to win something. Loss and avoidance are potent black hat motivators that reinforce risk-taking behavior, but they should be employed with caution because they play a key role in reward inconsistency	Chou (2019); Marczewski (2015)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Automated feedback	If a user logs in for a number of days in a row, the system will display a message to commend them on their reliability.	Tao et al. (2022)
Social Discovery	Building new relationships requires the ability to find and be found by others. Matching people based on interests and status can help get people started.	Marczewski (2015)
Sorting and Matching	These are both cognitively pleasant operations that involve conceptual or declarative knowledge by sorting, matching, and association of information. Gamification effectively employs the concept of sorting to test the human brain and boost immersion through cognitive gratification. This cognitive stimulation is delivered through enjoyable word-puzzle interactions.	Kim (2015)
Meaningful Choices/ Creativity Tools	This element allows users to express their creativity and autonomy by controlling their learning experiences. It is usable in activities that enable users to choose their particular strategies, tools, or approaches to succeed in their goals.	Lee et al. (2023); Marczewski (2015); Chou (2019)
Social Pressure	People often do not like feeling they are the odd ones out. This can be utilized in a social setting to encourage people to act like their friends. Can demotivate if expectations are unrealistic.	Marczewski (2015); Chou (2019)
Appointment Dynamics	This is a wonderful approach to using a predefined or repeating timetable in which users must act in order to earn a benefit. Appointment dynamics operate as a trigger, causing users to perform on a set schedule.	Chou (2019)
Evanescent Opportunities	These are those situations where users must take the desired action immediately to avoid losing the opportunity by urging them to act for fear of losing a great deal.	Chou (2019)
Community Collaboration	This is utilized to instill the belief that working together is superior to working alone by helping us to overcome and succeed in the face of adversity.	Chou (2019)
Demonstration	The demonstration is a social gamification element, and hence the one that allows the users to become the most involved in the community and allows them to share with others what they have achieved. For users to desire to share their success, they must be willing to acknowledge the achievements of others.	Kim (2015); Kapp (2012)
Group Quests or Team Missions	This is the ideal gamification feature for engaging everyone in something that improves the entire team by building teamwork skills and raising collaboration and participation rates. Members can improve their intrinsic motivation, communication skills, performance, and leadership.	Chou (2019); Marczewski (2015)
Mentorship	Starting over in a new setting can be a difficult task. Pairing your new engaged users with someone who has the knowledge and can explain to them exactly how something works is an effective way to make this process more enjoyable.	Toda et al. (2019); Chou (2019)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Desert Oasis	This is a simple visual design that emphasizes solely the anticipated purpose or activity, similar to a desert oasis. Because there should be little to no distractions, this can be a very useful approach when we want people to focus on a specific action.	Chou (2019)
Crowning	This is the perfect competition element for promoting a sense of achievement. We suggest which performance is highest and create a special status or even a reward for whoever achieves it.	Chou (2019)
Freedom of choice	Users have the ability to choose something (e.g., avatar) or their own path rather than having one predetermined for them. Different outcomes can arise from different choices. They can occasionally go to the same destination with distinct tales, and they can even lead to completely different endings. Giving learners several ways to demonstrate competency in a skill is one method to give them the freedom to choose.	Dicheva et al. (2015); Wang et al. (2022)
Freedom to fail	This entails allowing pupils to experiment and fail without pressure or fear of lasting damage. Allowing students to fail in a MOOC is vital for retaining student enthusiasm since it stimulates experimentation in problem-solving and builds perseverance through challenging assignments.	Dicheva et al. (2015); Hsu and Fang (2022); Kapp (2012)
Progress bar or Checklist	Progress provides the learner with positive reinforcement that they are on the proper track, and crossing items off the list provides the learner with a sense of accomplishment. Learners' progress is usually represented as a progress bar or checklist.	Antonaci et al. (2018); Chou (2019); Dicheva et al. (2015); Hocine (2021); Kapp (2012); Kim (2015); Marczewski (2015); Morrison and DiSalvo (2014); Wang et al. (2022)
Narrative	A narrative presents events that supply people with the information they need to take the necessary actions. A great narrative is a good method to promote meaning through gamification.	Chou (2019); Marczewski (2015); Antonaci et al. (2018); Wang et al. (2022)
Role-play	In a gamified system, role-playing allows participants to choose their preferred point of view within a course, determining their learning experience. In role-playing, the avatar is typically linked to the role-playing.	Zhang (2008)
Social Engagement Loops	These ensue when a call to action re-engages a user and causes them to feel motivated, increasing their likelihood of responding to further calls to action.	Dicheva et al. (2015); Kim (2015)
Smooth Learning Curves	They provide for an easy evolution from novice to expert. The gamified system must instruct learners on how to address issues during various learning phases.	Antonaci et al. (2018)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Skill trees	Skill trees are identical to levels in many ways, but they vary in how users decide which path to take. They are the narrative-oriented component of the gamification mechanics and the meanings that impact users' behaviour and potential actions.	Antonacci et al. (2018); Marczewski (2015)
Goal Indicators	They inform players about their present goals in the gamified system and assist in indicating, setting, and following clear goals. Goal indicators and skill trees are used to improve goal achievement and the engagement of MOOC participants.	Antonaci et al. (2018)
Empowerment	This allows the user to feel autonomous and responsible for his learning which he can shape according to his values and vision to engage in a creative process.	Antonaci et al. (2018); Chou (2019)
Time limits	This element is a method of counting the hours, minutes, and seconds allocated for the completion of an action or a goal achievement to be used to indicate someone's effectiveness, and it is frequently associated with feedback, challenges, levels, points, and so forth.	Decheva et al. (2015)
Limited Planning Ability	Many gamified apps do not allow users to correctly plan their behaviour beyond a certain point. This Limited Planning Ability can exist because users lack all of the information, future actions and events are difficult to predict, or users just do not have the time to plan. Limited Planning Ability can be achieved by including restricting the number of things that can be planned, making occurrences unexpected, and limiting the amount of time users have to plan.	Antonacci et al. (2019)
Replayability or Repetitive tasks	A gamified course fosters replayability, which means that learners will want to return to the material to better interact with their education. Gamified applications' replayability can be leveraged to increase retention. Replayability is a crucial concept when developing a gamification mechanic to cater to repetitive actions.	Antonaci et al. (2019); Kim (2015)
Experience Consequences	This allows learners to practice applying the rules in settings where they are timed or where points are awarded for a right or erroneous analysis of the rules. Allow students to experience the implications of their decisions and comprehend their progress. A domain that helps learners apply knowledge and experience the consequences of their actions is Experiential learning.	Marczewski (2015)
Social simulator	This is a setting in which learners are positioned in an environment where they must interact. It is an appropriate gamification element for soft skill learning. The environment alters as a result of the actions of the learners.	Kapp (2012); Kim (2015)
Experiencing the concept	This is a suitable gamification element to learn conceptual and declarative knowledge.	Kapp (2012); Kim (2015)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Experience Points or Skill Points	They are feedback mechanisms connected with the completion of specified behaviours or achievements. Experience points might be utilized for measuring achievement or as an interchange mechanism for gaining things.	Chou (2019); Marczewski (2015)
Theme	This element might be anything that is relevant to the project's goal. It's a means to connect the narrative while also engaging users in a creative activity. A theme pervades the entire story, ensuring continuity.	Toda et al. (2019)
Juicy feedback	Feedback is an essential component of any type of gamification content since it informs the learner of the correctness of his or her activities while also offering interest, immersion, and guidance. Juicy feedback is both visually and acoustically engaging and rewarding, and it is frequently utilized to reward users. Gamification should provide juicy feedback, which is frequently absent in real life. In contrast to real-life, juicy suggests that the input is "fresh" and encouraging.	Kapp (2012); Krath et al. (2021)
Stimulated planning	This element was inspired by the application of intention theory by providing users with the opportunity to plan their strategy in order for them to feel powerful; also, this planning activity might assist them to concentrate better. Moreover, this is the effect of predictable consequences and either Freedom of Choice or an Illusion of Influence.	Antonaci et al. (2018)
Scarcity and Impatience	They are viewed as black hats since they cause us to feel obsessed, nervous, and addicted. Since we can not have something right away or since getting it is really tough, scarcity and impatience are the motivations that push us forward.	Chou (2019); Marczewski (2015)
Haptic devices	They can simulate tactile sensations and feedback forces that correlate to body architecture and tissue densities. They are capable to reproduce physical tactile sensations in response to movements. Gamification can help to direct and intensify the user's efforts in a virtual simulator.	Kapp (2012); Tao et al. (2022)
Providing success	Providing success experiences can boost self-efficacy by giving role models and convincing users that they can achieve a goal by providing them with guidelines.	Kapp (2012); Kim (2015)
Conformity Anchors	They occur when we allow the opinions and actions of plenty of our friends to influence our own, leading us to opt to normalize (i.e. react in a similar way). It's a circumstance where you choose to do what most of the population is doing, despite the fact that we might not completely agree with them.	Chou (2019)
Software challenges	They are elements that can be used to learn procedural knowledge. They can aid in the development of training courses that provide answers to these challenges, allowing users to overcome them and work more efficiently.	Kim (2015)

<Table 2> Main Elements, Techniques and Reward Systems of Gamification in MOOCs (Cont.)

Elements, Techniques and Rewarded Systems	Description	References
Novelty	Novelty is inextricably linked to changes that occur inside the setting, such as the addition of new information, material, or even new gamification aspects. Since continuous studies on gamification have been conducted, it is a useful technique to keep consumers within the context to avoid stagnation.	Hanus and Fox (2014); Toda et al. (2019)
Immersion experience	This refers to gamification elements that aim to immerse a user in an experience. Immersion-related elements aim to immerse the user in a self-directed activity and may include storytelling, avatars, or role-playing.	Kapp (2012); Wang et al. (2022)
Handicaps	They take into account ability and experience level, allowing beginners to be put alongside specialists while also motivating them to improve their handicaps. For example, an expert may receive 60 points each day, whilst a less competent user may receive 40. Following the handicap modification, the lower-end user may get 50 points rather than 40.	Antonaci et al. (2018)
Lose track of time	Losing track of time is a normal event that many individuals experience. The user loses track of time or time appears to pass quickly. When a learner becomes fully interested in an activity, they lose track of time, which is the ultimate goal of gamified learning.	Chou (2019)
Knowledge maps	Knowledge maps are widely utilized to display an overview map or tree structure to assist users in completing the next task.	Krath et al. (2021); Marczewski (2015); Morrison and DiSalvo (2014)
Exploration	Exploration allows the user to research and discover system regions and aspects by means of exploratory tasks, incomplete information, and enigma boxes.	Marczewski (2015)

assist the user in simply perceiving their way to accomplishing the objective while further enhancing enthusiasm and attentiveness.

Knowledge maps and progress indicators/bars have also been used on Khan Academy's MOOC platform to increase user motivation (Morrison and DiSalvo, 2014).

Points, badges, and leaderboards (Dicheva et al., 2015) and virtual goods (Chang and Wei, 2016) are the most popular, attractive, and commonly used elements in MOOCs and positive reinforcement tools that are used to encourage user participation, as well as the reward that provides users greater motivation to complete assigned learning activities (Morales et al., 2016). According to Ling et al. (2018), the most satisfying gamification elements in MOOCs are leaderboards, badges, and competition.

According to Facey-Shaw et al. (2020), gamification using badges can influence motivation, provide social recognition, and encourage learner participation but does not increase intrinsic motivation scores. According to Antonaci et al. (2018), goal indicators, levels, and communication channels enhance user learning achievement in MOOC, levels, storytelling, avatars, and communication channels enhance user learning performance in MOOC, and

goal indicators, score, and communication channels enhance user engagement in MOOC. Navío-Marco and Solórzano-García (2021) investigated gamified MOOCs and showed that participants with the most karma points had the highest completion rates.

Morales et al. (2016) suggested that MOOC environments can be gamified by rewarding learning activities, using levels and leaderboards to encourage progress and competition, and awarding badges for forum participation. The effect of their research revealed that this strategy was the most effective and that learning activities were completed with more eminent motivation. Staubitz et al. (2014) articulated their claim that implementing a social graph to strengthen the gamification of a platform can cause factor-relatedness to heighten. Owing to this notion, any person's position in a leaderboard state has extra pertinence when s/he is surrounded by acquaintances instead of unfamiliar users.

According to Wang et al. (2022), rapid feedback is essential, and immediate feedback is critical. Competition is an important critical feature of successful gamification and team-based competition that allows students to compete to answer problems and can promote learners' participation and focus. The freedom to fail is an important element of success, and points can be used to relate efforts, performance, and results. The implementation of a scoring method might be beneficial in training gamification by improving learning effects and raising student reactions and expectations. Storytelling has a significant role in capturing the pupils' attention. Immersion in learning would result if the following conditions were met: clear and fair gamification standards, risk-free experiential activities that allow for failure, and a training program.

According to Toda et al. (2019), acknowledgment may lead the user to a state of frustration and may cause unexpected outcomes. The level is considered a relevant element, especially when tied to progression. Time Pressure may lead the learner to a state of boredom since they might not feel challenged or pressured to complete a task. The objective is the most relevant element to use within gamified educational environments and is presented in all educational environments since the main focus of these applications is to make the student learn or practice a concept. Reputation is related to the social status the learners may acquire in the environment. Social Pressure is usually considered one of the most irrelevant among all elements. Renovation is also a concept that is present in almost all educational environments since learners can redo a task if they fail, or just want to remember a concept. Sensation is usually presented as a pleasant interface that is appealing to the user. Narrative is related to the learner's interaction with the system, affected by their characteristics. The sensation is usually presented as a pleasant interface that is appealing to the user.

Ⅴ. Results of Research

The results of this study might offer broader information on the theoretical and practical background of gamification in MOOCs that could lead to more improved gamified MOOCs used for educational purposes. Moreover, findings might offer practical guidance on what should be considered when creating and implementing gamified and adaptive learning in MOOCs concerning gamification theories, strategies, and elements.

This article's analysis concerning gamification in general and its application in MOOCs brings to light the most critical problems the researchers try to address and which methods they use to solve them.

<Table 3> Main Theories Used in Gamified and Adaptive Gamified MOOCs

Gamification Theories	Researcher(s)	Year	Citations	Citations in Gamification
Gamified learning theory	Landers Zaric et al.	2014 2021	984 19	39
Self-determination theory	Ryan and Deci	1985	10,543	244
Flow theory	Csikszentmihalyi	1970	47,336	92
Self-efficacy theory	Bandura	1982	118,458	24
Uses and gratifications theory	Katz et al. Ruggiero	1974 2000	1,600 4,646	3
Social constructivism (scaffolding) theory	Rohman and Fauziati	2022	1	0
Social comparison theory	Festinger Goethals and Darley	1954 1987	32,400 304	2
Theory of gamification effectiveness	Amir and Ralph	2014	37	3
Relationship quality theory	Morgan and Hunt	1994	14,698	0
Argumentation theory	Lewinski and Mohammed Eemeren et al. Lewinski et al. Walton	2014 1987 2016 2009	44 1,228 46 196	1
Goal-setting theory	Locke and Latham Lunenburg	1968 2011	3,176 1,567	64
Cognitive evaluation theory	Deci and Ryan	1980	71	42
Achievement goal theory	Nicholls Hulleman et al.	1984 2010	1,736 1,440	11
Social presence theory	Short et al. Gunawardena Lowenthal	1976 1995 2010	5,301 2,195 468	2
Theory of planned behavior	Ajzen Conner and Sparks	1985 2005	126,935 211	42
Motivational affordances theory	Deterding et al. Zhang	2011 2008	12,363 371	3
Unified theory of acceptance and use of Technology	Venkatesh et al. Omer et al.	2003 2015	14,428 21	18
Operant conditioning theory	Skinner	1938	18,723	23
Expectation confirmation theory	Oliver Bhattacherjee	1980 2001	23,688 10,296	7
Task-technology fit theory	Goodhue and Thompson Vanduhe et al. Kim and Song	1995 2020 2021	7,751 168 24	2

<Table 3> Main Theories Used in Gamified and Adaptive Gamified MOOCs (Cont.)

Gamification Theories	Researcher(s)	Year	Citations	Citations in Gamification
Technology acceptance model theory	Davis Chau Sukkar and Hasan	1989 1996 2005	81,299 1,836 200	65
Technology-enhanced training effectiveness model	Landers and Callan Landers and Armstrong	2012 2017	510 138	51

In contemporary MOOCs, gamified and adaptive gamified MOOCs are research domains for addressing the challenges and shortcomings of conventional MOOCs. Both innovations boost the effectiveness of traditional MOOCs by addressing some of their weaknesses or challenges outlined below.

The analysis of the research results, after a detailed review, concludes that the main theories, strategies, elements, and techniques used in gamified and adaptive gamified MOOCs are as follows.

The most influential gamification theory is Self-Determination Theory, followed by Flow theory, third is Technology Acceptance Model Theory, fourth is Goal-setting theory and then the rest. Chen and Jang (2017), supported that Flow theory has been frequently connected with the Self- Determination Theory, and the Technology Acceptance Model and a model based on Self-Determination Theory did not predict learning outcomes in online programs. The findings of Martin et al. (2018) research provide initial evidence suggesting that a design approach of Self-Determination Theory can be used to create MOOCs that effectively engage learners.

The first three gamification strategies, positively

<Table 4> Main Strategies Used in Gamified and Adaptive Gamified MOOCs

Gamification strategies	Researcher(s)	Year	Citations
Challenge-based (achievement-based or reward-based)	Koivisto and Hamari	2019	56
Immersive-based	Concannon et al.	2019	3
Social-based	Romero	2017	6
Goal-based	Cho et al.	2021	10
Attention-based	Hocine	2021	3
Persuasive-based	Orji et al.	2018	26
Competitive-based	Johnson et al.	1985	13
Progression-based	Kapp	2012	7
Story-based	Guerrero and Kalmi	2022	23
Card-based	Sobrino-Duque et al.	2022	1
Service-based	Blohm and Leimeister	2013	6
Theory-based (multi-component)	Peña et al.	2020	83
AR-based	Reitz et al.	2016	14
Guided discovery based	El-Magd	2017	4
Team-based	Guido et al.	2004	53

affect learners' internal experiences by standing through MOOC, such as cognitive involvement, flow experience, and social presence.

The most influential gamification strategy is theory-based, followed by challenge-based, third is team-based, fourth is persuasive-based, fifth is story-based and the rest.

The main elements and techniques used in gamification, gamified MOOCs and adaptive gamified MOOCs are presented in <Table 2>.

Ⅵ. Discussion and Conclusions

The gathering information mentioned above will be used to make conclusions about the main theories, strategies, and elements used in gamified MOOCs and adaptive gamified MOOCs.

As mentioned above, gamified and adaptive gamified MOOCs are research areas that aim to address the challenges and shortcomings of conventional MOOCs. The added value of this article is its contribution to research through an extensive literature review to highlight the theories, strategies, and elements that have been used so far to provide a compass for the design of future gamified and adaptive gamified MOOCs by helping researchers from these MOOCs in their respective fields. The use of gamification theories, strategies, and elements in MOOCs adds value to distance education by increasing the completion rate of MOOCs (reducing dropouts) and improving student engagement, motivation, interaction, and overall performance as well as collaboration among them, decreasing loneliness, increasing active participation and retention in them, improving user satisfaction, affecting the way students perceive their progress and through them the learning outcomes set are achieved.

Various gamification strategies such as achievement-based, immersive-based,social-based, goal-based, and attention-based have been used aligned with educational goals and user environments to effectively improve learner engagement and encourage learning to increase user motivation, engagement, and deep learning.

Methods and techniques are used in gamified and adaptive gamified MOOCs to improve the effectiveness of conventional MOOCs by using adaptive gamification elements to specific user characteristics to increase learner engagement and other challenges and can be automatically adapted.

The plethora of theories, strategies, and elements mentioned above would be a welcome project to be enriched with more applications to increase their effectiveness and make them even more attractive. Tables 3 and 4 show that the most influential gamification theory is the Self-determination theory, followed by the Flow theory, 3rd is the Technology Acceptance Model Theory, 4th is the Goal-setting theory, and the rest. The most influential gamification strategy is theory-based, followed by challenge-based, 3rd is team-based, 4th is persuasive-based, 5th is story-based, and after the rest.

According to current research, the most popular, exciting, and frequently used gamification elements are points, badges, and leaderboards. Moreover, other significant elements are rewards, competition, narratives, challenges, knowledge maps, progress indicators, virtual goods and coins, Karma points, etc.

Individual courses get value via gamification elements such as point values, scores for different classes or materials, and other awards. According to the research, those who link a motive to what they are learning will retain the educational material more effectively and succeed with better results in the long run. In general, gamified learning operates on multi-

ple levels to ensure the users receive the most out of the experience.

The study also concluded that every researcher pursues to create a self-oriented application for understandable reasons. However, it would be desirable to synthesize the existing research in such a way as to have improving promotional compositions, without discounts on deepening, with much better results.

This study might contribute through the findings of research for use by MOOC designers or developers for their MOOC design to avoid or minimize shortcomings, and manage the challenges systematically. Moreover, they might use the corresponding report for general information on innovations of MOOCs on gamified MOOCs to highlight the role of theories, strategies, and elements in improving effectiveness in gamified and adaptive gamified MOOCs.

From a theoretical standpoint, this work assists in informing researchers and developers about the theories, strategies, and elements used by the gamified and adaptive gamified MOOCs developed so far. At a practical level, the corresponding elements used and the improvements they bring to specific applications of gamified and adaptive MOOCs are presented for further information, study, application, and future research.

According to them, more flexible, engaging, effective, and entertaining MOOCs may be developed that will improve and address the current challenges of conventional MOOCs. Also, the study's findings have practical consequences for both MOOC designers and developers, providing useful insights for enhancing techniques adapted to the specific MOOC ecosystem. Furthermore, these discoveries have the potential to broaden the range of linked fields.

According to the findings of this study, to properly engage with the gamified system, the software developer must receive and assess feedback and match the gamified system's purpose with the user's goals. In the same way that antecedents influence gamification effectiveness, immersive dynamics influence a player's engagement in a gamified system or activity.

Using more student-centered theories, strategies, and elements might improve the effectiveness of MOOCs by facing the high dropout rate, low participation, low completion rate, high attrition rate, feelings of loneliness, low engagement, low retention rate, etc. Several researchers are moving in this direction to achieve the best possible result in the approach of MOOCs by the trainees. An attractive area that could further enhance student engagement, retention, and interest is IoT technologies into gamified or adaptive gamified MOOC applications. Moreover, users can improve their skills and mainly develop creative skills while having fun by making their educational experience more enjoyable and meaningful.

Regarding the limitations and implications of this study, there may be other theories, strategies, elements, and techniques used in gamified and adaptive gamified MOOCs that are not indexed in the Google Scholar and Scopus engines used to search the sources that make this research more limited than it should be.

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