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Gamification in higher education: A review of the literature

Byron Castillo-Parra [1*], Superior Polytechnic School of Chimborazo, Faculty of Pecuarian Sciences, Panamericana Sur Km 1 1/2, Riobamba, Ecuador https://orcid.org/0000-0003-0661-8648

Byron Geovanny Hidalgo-Cajo [2], National University of Chimborazo, Research Department, Av. Antonio José de Sucre 1407, Riobamba, Ecuador http://orcid.org/0000-0002-5526-1676

Milton Vásconez-Barrera [3], Superior Polytechnic School of Chimborazo, Faculty Of Pecuarian Sciences, Panamericana Sur Km 1 1/2, Riobamba, Ecuador https:// orcid.org/0000-0003-2858-3853

Julio Oleas-López [4], Superior Polytechnic School of Chimborazo, Faculty Of Pecuarian Sciences, Panamericana Sur Km 1 1/2, Riobamba, Ecuador https://orcid.org/0000-0002-8576-248X

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Abstract

Gamification is a learning technique that transfers the mechanics of games to the educational environment in order to achieve better pedagogical results mediated by technological tools, this technique is used as an alternative to the traditional teaching methodology that is increasingly used in higher education, which is why the objective of the study is to know how gamification influences the teaching-learning process in higher education. In order to answer this question, a systematic review of the literature is carried out, based on the analytical method, using the scientific databases Web of Science and SCOPUS for the search of information. The impact of gamification within the formative context is significant since its evolution as a didactic strategy manages to meet the educational objectives improving learning outcomes, its application is methodical that considers the principles and appropriate elements of the game to solve problems and promote learning, which causes the change of student behavior, because it takes advantage of the main motivations of human behavior in two ways connected to each other: reinforcements and emotions, thus obtaining effective and motivated learning, reaching several types of knowledge, such as: declarative, conceptual, regulated, procedural, soft skills, affective and psychomotor mastery, which demonstrates its versatility and usefulness in learning environments.

Keywords: Game based learning, Higher education, Edugame, serious game, gamification.

[*] ADDRESS OF CORRESPONDENCE: Byron Castillo-Parra, Superior Polytechnic School of Chimborazo, Faculty Of Pecuarian Sciences, Panamericana Sur Km 1 1/2, Riobamba, Ecuador
Email address: byron.castillo@espoch.edu.ec

1. Introduction

Higher Currently education has had to adapt to a new educational environment with students called digital natives, in this scenario it is essential that the teaching-learning process innovates new teaching strategies such as gamification (strategies of video games in support of teaching-learning) that currently has generated very important educational expectations such as the development of commitment skills, increase motivation, interest in what they are learning, among others.

In particular, the teaching-learning process is essential in educational development, adapting to the needs of each social context and time; time shows how technologies have been implemented in different sciences such as medicine, economics, psychology, mathematics, among others, to improve their applicability and give better results, so it is increasingly common to use elements such as information and communication technologies (TIC) and relate them to teaching strategies such as gamification to support the educational process. It is known that gamification achieves a high level of student engagement when they are motivated, even preferring to continue with the game activity rather than end the class (Nivela et al., 2021). Historically, didactic support strategies and techniques have evolved, giving rise to new methodologies that address the needs of educational actors.

Ricardo-Barreto & Iriarte-Díazgranados (2017), state that one of the educational concerns in the face of the challenges presented by TICs is the level of use made of them at the different levels of the educational system. Although these technologies have reached the institutions, their use has been limited to their knowledge and instrumental management, but not to their pedagogical incorporation in the teaching and learning processes (Hidalgo-Cajo & Gisbert-Cervera, 2022). From this point of view, the educational process at the higher level still employs a traditional teaching methodology, despite having prepared teachers, qualified with full knowledge, the results are still not favorable.

Caliatto & Almeida (2020) in their research entitled learning and academic achievement in higher education, allow to know the perception of students, who state that the learning process is very limited and that the teaching model is deficient, attributing it to the lack of several factors such as motivation, communication, collaboration, participation, fun among others, which influence their perception of well-being and satisfaction in the student body, indispensable conditions for performance in the teaching-learning process.

Quintana & Prieto Jurado (2019), behaviorism is based on responses or actions of the individual to environmental stimuli, as something external to the brain. Cognitivism is based on the fact that behavior is influenced not only by stimuli but also by internal subjective variables; the characteristics of these two theories lead to the conclusion that behaviorism is related to extrinsic motivation, while cognitivism focuses on intrinsic motivation. From this perspective, in order to achieve learning, the teacher must explore the methods, techniques and strategies that allow him to induce the student in the acquisition of knowledge, although behaviorist and constructivist theories are the starting point for the analysis of the teaching and learning process, cognitivism plays an important role in the acquisition of knowledge, particularly if the work is done in analogy with motivation. It should be noted at this point that it is necessary to innovate the teaching-learning process by implementing new strategies such as gamification, which is a positive process that allows combining modern methodologies that are feasible for education, making experimental actions feasible for students, where they can recreate, retry, observe and innovate in order to learn (Álvarez & Norailith, 2019).

To innovate the educational process all its actors must be committed to implement new didactic strategies mediated by technology to overcome the techno-pedagogical gaps and thus promote educational innovation in analogy to the didactic and methodological resources that educators handle,

focusing on the subjects, with the use of TIC, thus transferring the educational scenario to a Virtual Learning Environment (VLE) whose purpose is the development of digital competencies. It should be noted that the synergy of all these resources can be applied in gamification as a didactic strategy that motivates students in the teaching-learning process (Mero Mendoza & Castro Bermúdez, 2021), "the application of principles and elements of the game in a learning environment in order to influence behavior and increase motivation and encourage student participation" (Miranda, 2018).

From this point of view, the motivation of the study is to know how gamification in higher education is impacting as a new technique or didactic strategy, mediated by the technological tool that will come to support the teaching-learning process in order to improve the environment and student motivation (J. Beltran et al., 2020).

In this sense, it should be noted that, the importance of educational technology, and its mediation with learning strategies such as gamification intend the development of activities in higher educational praxis, it is of great importance to take into account the knowledge and mastery by teachers of technological and pedagogical skills. In this same context, when considering the multidimensional environment of the modern university, it is essential to address the needs of innovation demanded by society; undoubtedly the Internet is the main protagonist of the great technological revolution of the XXI century, its inescapable presence has built the great scenario in which new ways of learning, thinking, communicating, doing and acting occur (Aguiar et al., 2019).

These studies lead researchers to analyze through a systematic review of the literature how gamification influences the teaching-learning process in higher education, In order to answer the main question it is necessary to investigate and answer the secondary questions, through the analysis of empirical evidence from the literature that allows us to understand the research problem in order to contribute and/or generate a manuscript that updates the main approaches on the subject, collecting the strengths and weaknesses, shedding light on new developments that allow the scientific community to redefine or refine the questions or hypotheses that contribute to educational innovation.

Research Questions

RQ.1. (Primary) - Research Objective: How does gamification influence the teaching-learning process in higher education?

RQ.1.1: (Secondary) - What are the factors that influence the use of gamification in the teaching-learning process in higher education?

RQ.1.2: (Secondary) - What are the benefits that gamification offers to the teaching and learning process in higher education?

RQ.1.3: (Secondary) - What are the characteristics that gamification possesses in the teaching and learning process in higher education?

2. Methodology

In this study we proceeded to establish a non-probabilistic intentional sample, framed in inductive and deductive methods in order to analyze and interpret the scientific articles and publications concerning the characterization of gamification in higher education in the teaching-learning process.

The study presents a bibliographic analysis, supported by the analytical method, which is a scientific research method that allows breaking down the research topic into parts, and from this, to analyze and understand relevant aspects for the study. To carry out the systematic review of the literature, it is essential to select sources of information with as many studies as possible Pascuas & Vargas (2017),

thus, search engines and databases of scientific and academic information, such as Web of Science and SCOPUS, were used.

2.1. Mapping and SLR research questions

The purpose of the collection of information is to develop a systematic review of the literature, which will allow answering the research questions, for subsequent argumentation, as well as formulating Mapping questions that complement the study allowing to give an overview of the situation and the evolution of research focused on gamification in the teaching-learning process in higher education.

Mapping Questions

Systematic Literature Mapping is a research method that allows tracking evidence in a domain with a high level of data granularity. It is common to use mapping as a preliminary (descriptive) phase to a systematic (analytical) review, which gives more context and structure to the object of study (García Peñalvo, 2017). From this perspective, the following mapping questions are posed.

MQ1: ¿How has the number of published papers on gamification in the teaching-learning process in higher education evolved over time?

MQ2: ¿What research methods were applied in studies on gamification in the teaching-learning process in higher education?

MQ3: ¿Which are the countries that have had the most interest in gamification in the teaching and learning process in higher education?

MQ4: ¿What are the areas of application of gamification in the teaching and learning process in higher education?

First, as suggested by Kroll et al. (2018) and Petersen et al. (2015), a series of research questions were established to perform a deeper analysis of the different studies presented in the literature, which requires a clear specification of the problem area and a critical review within this domain, in order to present an adequate line of argument that identifies the knowledge gaps and research needs to be addressed (B. A. Kitchenham et al., 2011; B. Kitchenham & Charters, 2007). Based on this analysis, the following questions have been generated to focus the search strategy:

RQ.1.1: ¿What are the factors that influence the use of gamification in the teaching-learning process in higher education?

RQ.1.2: ¿What are the benefits that gamification offers to the teaching and learning process in higher education?

RQ.1.3: ¿What are the characteristics that gamification possesses in the teaching and learning process in higher education?

2.2. PICOC selection process

The PICOC method (Population, Intervention, Comparison, Results, Context) is applied to define the scope of the review, which facilitated the process of analyzing the articles to answer the research questions and, therefore, to select the search terms.

The axes of the article selection strategy were, in the first place, to establish the inclusion and exclusion criteria, based on these criteria, the exploration of the information proceeded by applying Boolean search chains, for the selection of the literature, five phases are proposed: identification, elimination, revision, conduction and inclusion, which are detailed below:

2.3. Inclusion and Exclusion Criteria

The inclusion and exclusion criteria proposed to filter the original sample were decided based on pragmatism, seeking a reasonable balance between quantity and quality.

Table 1. Inclusion and/or exclusion criteria

N°	Inclusion	N°	Exclusion
CI1:	Published articles that refer to gamification in the teaching-learning process in higher education	CE1:	Articles that do not refer to gamification in the teaching-learning process in higher education.
CI2:	Found in SCOPUS and WoS databases	CE2:	Papers that focus on regional journals or that have no impact factor.
CI3:	Articles between January 2017 and February 2021.	CE3:	Articles published prior to 2017.
CI4:	Articles in the English and Spanish language.	CE4:	Articles other than English or Spanish language.
CI5:	Articles with qualitative and/or quantitative results with quality outcomes in formal education.	CE5:	Book chapters, short articles, lectures/workshops.

2.4. Search strategies

Using the observation and analysis technique, various research studies were collected from the scientific databases Web of Science and SCOPUS that contained information required for the study, which was organized in a systemic way.

2.5. Selection of descriptors and/or keywords

In the search descriptors, two main terms proposed for the review were used: 1): Gamification and 2) Higher Education. Each of these terms is supported through synonyms or similar key terms, which allow increasing the range of the search in both English and Spanish, with manuscripts of proven quality, the details of these terms are presented in Table 2.

Table 2. Search terms used in databases

Gamificación	**Educación Superior**
“Game based learning”	“Higher education”
“Game-based learning”	University College
Edugame	Tertiary education
“serious game”	“Higher education”
“computer game”	
“gamification”	

Based on the keywords presented in Table 2, several search iterations are proposed:

SCOPUS:

TITLE-ABS-KEY ("Game based learning" OR "Game-based learning" OR edugame OR "serious game" OR "computer game" OR gamification) AND ("higher education" OR university OR college OR "Tertiary education")

Web of Science

TS= ("Game-based learning" OR "Game-based learning" OR edugame* OR "serious game" OR "computer game" OR gamification*) AND ("higher education" OR university* OR college* OR "Tertiary education")

Then, according to the inclusion and exclusion criteria, we proceed to search the information by applying the different keywords and search strings in the different databases, from the application we obtain an important bibliographic corpus, being the last search carried out in November 2021. After this process, the SLR is applied:

2.6. Literature selection process

PHASE (1): identification

In the first instance, using search descriptors, representative studies were identified through the systematic selection and analysis of scientific information in two databases: Web of Science (102) and SCOPUS (100), with a total of 202 articles.

PHASE (2): elimination

In this phase of the 202 articles, we proceeded to verify if duplicate manuscripts were found, for which 52 documents were eliminated and a result of 150 articles was obtained.

PHASE (3): revision

For this, the literature was located and selected, strictly applying the inclusion and exclusion criteria previously stated by carefully reviewing the titles and content of the abstracts of the scientific articles in terms of gamification or serious games in the teaching-learning process in higher education, in this phase 50 manuscripts that met the criteria were obtained.

PHASE (4): conducting

In this phase it is very important since the complete text is reviewed according to the inclusion and exclusion criteria to execute this process a meta-analysis and meta-synthesis of the manuscripts is performed by means of:

1. Comprehensive reading: in order to understand the meaning of the content, inferring the implicit information of the research.

2. Intensive reading: which implies an extensive and thorough reading in its entirety, which supports each detail to be taken into account in the criteria sought in the line of research.

3. Critical reading: implies a deep analysis of the content, discovering possible counterarguments and that are examined from different points of view, which allows extracting the most valid information.

In case of finding information that does not meet any of the inclusion and exclusion criteria mentioned above, it will be immediately discarded, in order to maintain the comprehension and order of the work, in this process a compendium of 30 articles was achieved, but in the case of finding works that exceed these criteria, alternative questions, called quality criteria, were formulated.

PHASE (5): inclusion

To culminate with the selection process, the quality criteria were elaborated in order to achieve objective articles that surpassed the inclusion and exclusion criteria.

A total of 10 questions were asked (Table 3) with three response options: yes (1 point), no (0 points) and partially (0.5 points). The cut-off point for the choice of publications was 7.5 points.

Table 3. Questions for the evaluation of quality criteria.

N°	Ítems
1	Are the objectives of the research clear and directed to the line of research being studied?
2	Does the summary or abstract contain information relevant to the gamification methodology and its characteristics respectively?
3	Does it present a quantitative or qualitative analysis, for the elaboration of the analysis and conclusions?
4	Does it describe the cognitive competencies that gamification can develop?
5	Does it contain a previous study, for the reliability of the research?
6	Does it clarify the level of impact that the gamification methodology has on university students?
7	Do the researchers pose hypotheses that are related to other lines of research?
8	Does it show the impact and benefits on the educational work of teachers when implementing gamification?
9	Are the conclusions in accordance with the discussion and analysis of the research topic?
10	Does it clarify the relationship between gamification methodology and cognitive competencies, respectively?

When applying the quality criteria, the works with a score lower than 7.5 points were eliminated; therefore, of the 30 articles selected, only 21 of them passed all the criteria, they were documents that contributed to the research. The selection process is shown in Figure 1.

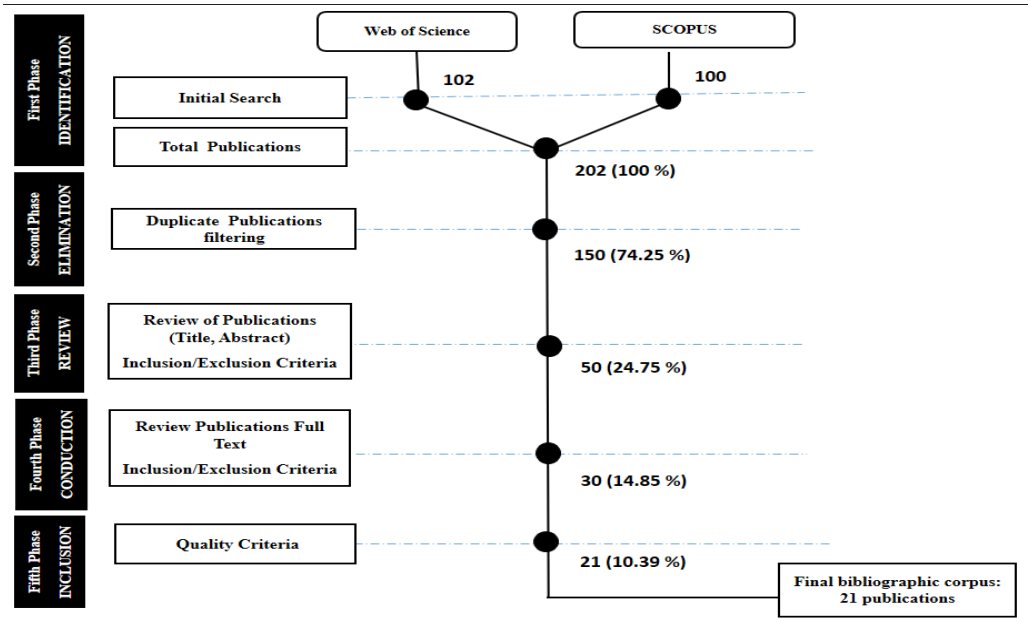

Figure 1. Selection process

The following section provides answers to the study questions through the analysis of the 21 selected articles, organized according to the questions posed by Mapping and SLR.

3. Results

3.1. Results Mapping

To answer the first question corresponding to MQ1, we performed a general review of the papers related to gamification in the teaching-learning process in higher education, where we analyzed the year of publication of each of the papers, which are framed in the period 2018 to 2021. As can be seen in Table 4 and Figure 2, the largest number of papers published in the systematic review were conducted in the year 2021, representing 38% of the total, followed by the year 2018 with 34% of the publications.

Table 4. Number of papers published by year in the systematic review.

Year	Nº of articles	Percent
2018	7	33,33%
2019	3	14,29%
2020	3	14,29%
2021	8	38,10%
TOTAL	**21**	**100,00%**

The publications made in the last years in different scientific journals, allow us to know the interest of researchers in the subject presented in the educational process in higher education, and that its application is evolving, which is an indicator that the scientific community is very interested in this type of tools that can benefit the teaching-learning process.

Regarding question MQ2, we carried out a general review of the research according to the research method applied, and they were distributed in this work as follows: 48% were quantitative studies, 28% were mixed studies and 24% were qualitative studies (Figure 2).

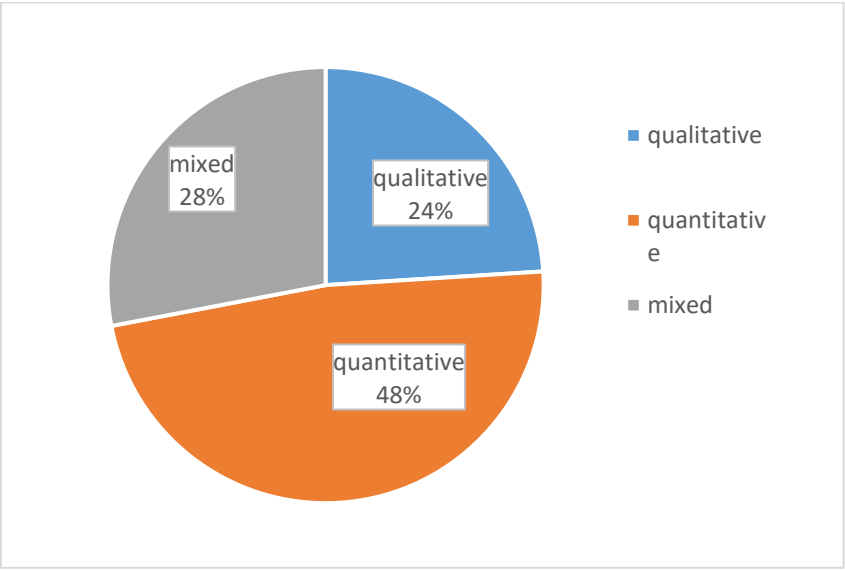

Figure 2. Research methods applied in the studies

Although the studies were significant in this area, it can be seen that research with a quantitative approach is more numerous, compared to the other studies.

In question MQ3, the countries that have published the most in the area of study were Spain, which represents 38% of the total, followed by Brazil, the United States and Mexico, which represent 9.5% respectively (Figure 3).

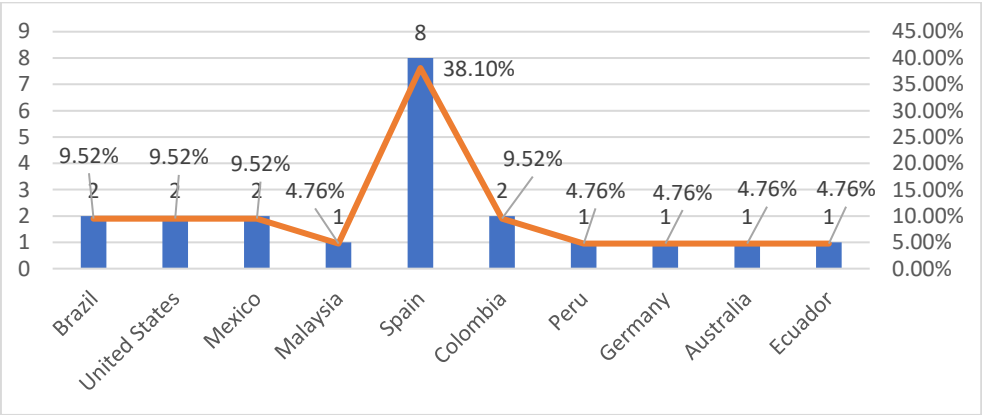

Figure 3. Geographical distribution of publications

Regarding question MQ4, which focuses on What are the areas of application of gamification in the teaching-learning process in higher education?

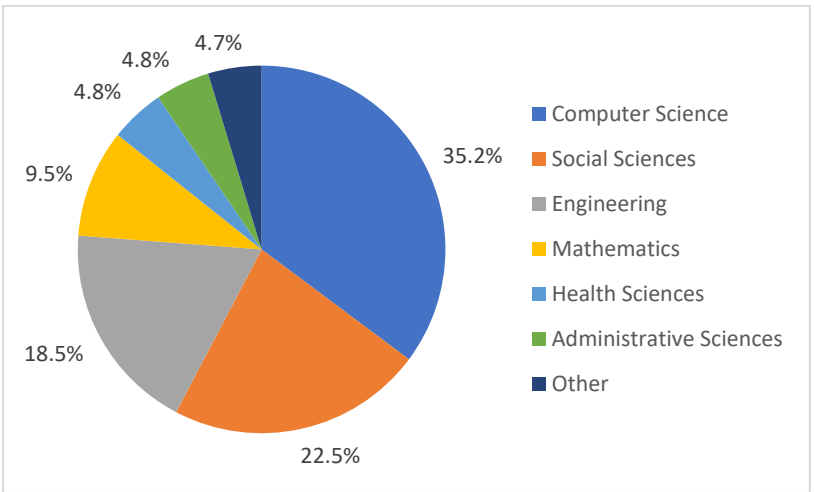

Figure 4. Areas of gamification application

It can be seen that within the teaching-learning process, gamification is present in different areas of knowledge and research related to these have a growing trend within the academic field, which allows the development of new tools that are incorporated into the dynamics of the teaching-learning processes.

Table 5. Summary of Mapping Responses

Question	Answers
MQ1	In the research, a general review of the papers related to gamification in the teaching-learning process in higher education was carried out, and the year of publication of each of the papers was analyzed, in the period 2018 to 2021, being 2021 the year in which more publications were obtained recognizing the interest of the scientific community on the topic of study.
MQ2	A general review of the research methods used in the studies was carried out, and the results showed that 48% were quantitative studies, 28% were mixed studies and 24% were qualitative studies.
MQ3	The countries that have published the most in the area of study are Spain, which represents 38% of the total. This is followed by Brazil, the United States and Mexico, which represent 9.5% respectively.
MQ4	As can be seen within the teaching and learning process, gamification is present in different areas of knowledge and research related to these have a growing trend within the academic field, being the area of computer science where gamification is most applied.

3.2. Results of the SLR study

The analysis carried out to answer the first research question (RQ.1.1), which corresponds to What are the factors that influence the use of gamification in the teaching-learning process in higher education? (Table 6).

Table 6. Context in which the studies were conducted (authors - factors)

Authors	Year	Context				
		Curiosity	**Problem Solving**	**Defiance**	**Recognition**	**Sense of belonging**
Gláuber Guilherme Signori, Julio Cesar Ferro De Guimarães, Eliana Andrea Severo and Claudio Rotta.	2018		X		X	X
Subhash & Cudney	2018		X			X
Ana-M. Ortiz-Colón**,** Juan Jordán, Míriam Agredal	2018	X	X		X	
Cantú-Martínez & Rojas-Márquez	2018		X			X
Hernández-Horta, Ingrid A.; Monroy-Reza, Anderson y Jiménez-García, Martha	2018		X	X	X	X
Manjet Kaur Mehar Singh, Malini Ganapathy, Debbita Tan Ai Lin.	2018	X	X	X	X	
Isaac Pérez López, Enrique Rivera García	2018	X	X	X	X	X
Altamirano-Droguett JE, Araya-Crisóstomo SP, Contreras MP	2019		X		X	X
Jimmy Yordany Ardila Muñoz , Didier Fabian Torres Acosta y Pablo Ferney González Lizarazo.	2019		X	X		X
Fernández-Sánchez, María Rosa and Sierra Daza, María Caridad	2019				X	X
Sánchez-Martín, J., Corrales-Serrano, M., Luque-Sendra, A & Zamora-Polo, F.	2020	X		X	X	X

Zainuddin, Samuel Kai Wah Chu, Muhammad Shujahat, Corinne Jacqueline Perera	2020		X	X	X	X
Panis, I. C., Setyosari, P., Kuswandi, D., & Yuliati, L.	2020	X	X		X	X
Acosta-Medina, J, Torres-Barreto, M, Cárdenas-Parga, A	2021	X	X		X	X
Del Carmen Pegalajar Palomino M.	2021		X	X	X	X
García Magro & Martín Peña	2021		X	X		
Jefferson Beltran Morales, Héctor Sánchez, Mercedes Rico	2021		X	X		X
Joel Manuel Prieto Andreu	2021		X	X	X	
Romero Rodrigo & López Marí, M	2021		X		X	X
Lidia Aguiar-Castillo, Alberto Clavijo-Rodríguez, Lidia Hernández-López, Petra De Saa-Pérez, Rafael Pérez-Jiménez	2021	X	X	X		
Luis R. Murillo-ZamoranoMurillo-Zamorano, José Ángel López Sánchez Ana Luisa Godoy-Caballero & Carmen Bueno Muñoz	2021		X	X	X	

According to the information analyzed, the predominant factors in the use of gamification in the teaching-learning process are based on motivation in problem solving, causing in the student a recognition (badges) and sense of belonging for the activity completed, whose process is framed in the challenge and curiosity. Variables that influence students to have a better perception of gamification and/or serious games in the educational process, generating intrinsic motivation from the cognitive approach.

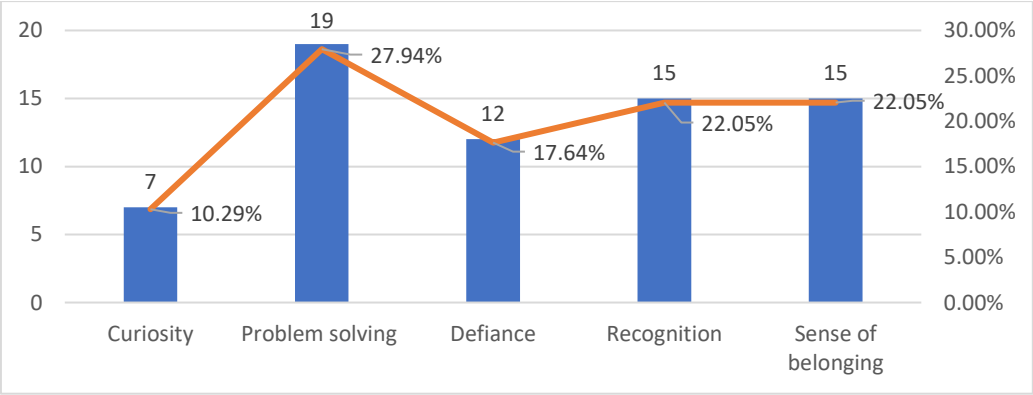

Figure 5. Factors that influence the use of gamification in students.

The results obtained are corroborated by Pablo Rodríguez et al. (2021) who affirms that intrinsic motivation has a direct relationship with emotional intelligence in university education since it influences academic performance with positive emotions, this generates interest, curiosity, ability to experiment and self-regulate their learning. By applying gamification in university students has shown personal initiative, as well as adaptive skills to perform their tasks.

To answer the second question corresponding to RQ.1.2: What are the benefits that gamification offers to the teaching-learning process in higher education? Six benefits have been determined according to the literature of the 21 selected articles, presented in Table 7.

Table 7. Benefits of gamification in the teaching-learning process

Authors	Year	Benefits					
		Compromise	**Academic performance**	**Enjoyment**	**Achievement of learning objectives**	**Teamwork**	**Motivation**
Gláuber Guilherme Signori, Julio Cesar Ferro De Guimarães, Eliana Andrea Severo and Claudio Rotta	2018	X		X	X		X
Subhash, S and Cudney, EA	2018	X	X			X	X
Ana-M. Ortiz-Colón, Juan Jordán, Míriam Agredal	2018		X	X			X
Cantú-Martínez, P. y Rojas-Márquez, J.	2018		X				X
Hernández-Horta, Ingrid A; Monroy-Reza, Anderson y Jiménez-García, Martha	2018		X	X	X		X
Manjet Kaur Mehar Singh, Malini Ganapathy, Debbita Tan Ai Lin	2018	X			X		X
Isaac Pérez - López, Enrique Rivera García	2018		X		X	X	X
Altamirano-Droguett JE, Araya-Crisóstomo SP, Contreras MP.	2019		X		X		
Jimmy Yordany Ardila-Muñoz	2019	X		X	X		
Sierra Daza, María Caridad and Fernández-Sánchez, María Rosa	2019			X	X		X
Sánchez-Martin, J., Corrales-Serrano, M., Luque-Sendra, A & Zamora-Polo, F.	2020		X	X	X		X
Zamzami Zainuddin, Samuel Kai Wah Chu, Muhammad Shujahat, Corinne Jacqueline Perera	2020	X	X		X		X
Panis, I. C., Setyosari, P., Kuswandi, D., & Yuliati, L.	2020		X		X		
Acosta-Medina, J, Torres-Barreto, M, Cárdenas-Parga, A	2021	X		X			X
Del Carmen Pegalajar Palomino M.	2021		X	X	X		X
García Magro & Martín Peña	2021	X		X	X		
Jefferson Beltrán Morales, Héctor Sánchez, Mercedes Rico	2021	X	X	X	X		X
Joel Manuel Prieto Andreu	2021		X	X	X		X
Romero-Rodrigo, M. & López-Marí, M.	2021			X	X		X
Lidia Aguiar-Castillo, Alberto Clavijo-Rodríguez, Lidia Hernández-López, Petra De Saa-Pérez, Rafael Pérez-Jiménez,	2021	X			X		X
Luis R. Murillo-Zamorano, José Ángel López Sánchez, Ana Luisa Godoy-Caballero & c Carmen Bueno Muñoz	2021		X		X		

As can be seen in Table 7, the main benefits of gamification in the teaching-learning process are presented, which is considered as a didactic strategy that achieves the learning objectives by motivating students to carry out an educational process that encourages commitment and teamwork that substantially improves academic performance, enjoying learning in synergy with serious games.

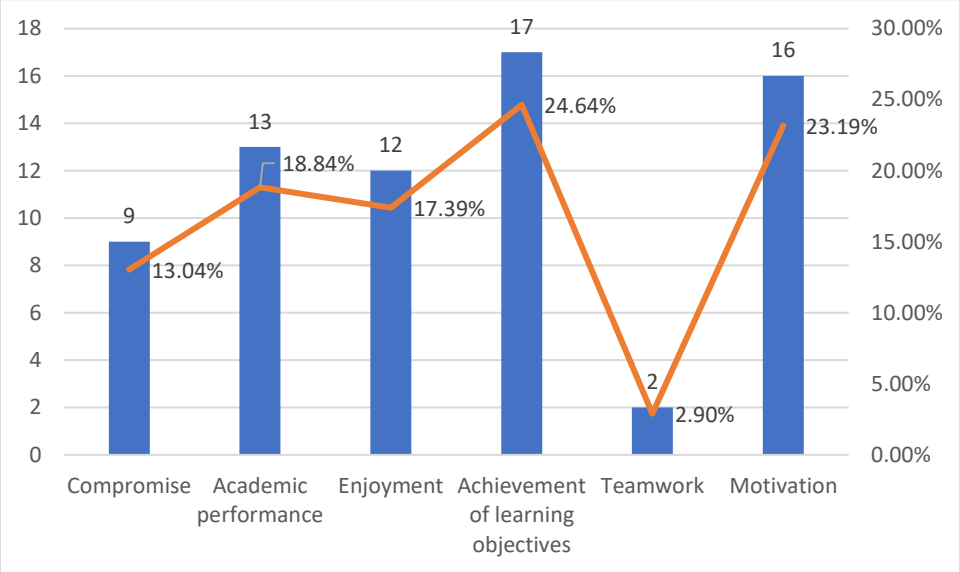

Figure 6. Benefits of gamification in the teaching and learning process.

When using gamification as a teaching method in university students, educators have identified the satisfaction perceived by their students when acquiring new knowledge, however, they consider that there are other premises that influence the improvement of the learning process, such as creating a good academic environment, promoting a game methodology based on the experience of the class taught, as well as the use of shared evaluations.

In trying to answer the question **RQ.1.3** What are the characteristics that gamification possesses in the teaching-learning process in higher education, this question is presented in Table 8.

Table 8. Characteristics of gamification

Characteristics	Games	Serious Games	Gamification
Enjoy	X		X
Entertainment	X		X
Self-motivation	X		X
Learning Objectives		X	X
Creative Solutions	X	X	X
Cognitive Development	X	X	X
Imagination	X	X	X
Encourages learning		X	X
Problem solving		X	X
Generates different types of knowledg			X
Creative potential			X
Formal education		X	X

The literature review allows comparisons between games, serious games and gamification, although games are directly focused on entertainment but not on learning, which in serious games is the main objective and in these games fun is not the purpose, on the contrary, gamification has an important relationship between games and serious games between fun and motivation for learning used in formal

higher education. From this perspective it can be mentioned that the characteristics of gamification is the synergy between games and serious games taking the best of each of them transforming the educational process in innovative learning environments.

The impact of gamification within the formative context is significant since its evolution as a didactic strategy improves the results in education and learning, it is a methodical application that considers the principles of the game to solve problems and promote learning through the application of challenges and objectives, using appropriate elements of the game, which causes the change of the students' behavior, because it takes advantage of the main motivations of human behavior in two ways connected to each other: reinforcement and emotions, thus obtaining effective and motivated learning, reaching several types of knowledge, such as: declarative, conceptual, regulated, procedural, soft skills, affective and psychomotor mastery, which demonstrates its versatility and usefulness in learning environments. On the contrary, a poorly designed gamified learning plan or lack of understanding could fail to achieve the learning objectives and not achieve the purpose of the training process.

To conclude this section, we show the summary of the SLR responses (Table 9).

Table 9. Summary of SRL responses

Question	Answers
RQ.1	The impact of gamification within the formative context is significant since its evolution as a didactic strategy improves results in education and learning, it is a methodical application that considers the principles of the game to solve problems and promote learning through the application of challenges and objectives, using appropriate elements of the game, which causes the change of student behavior, because it takes advantage of the main motivations of human behavior in two ways connected to each other: reinforcements and emotions, thus obtaining effective and motivated learning, reaching several types of knowledge, such as: declarative, conceptual, regulated, procedural, soft skills, affective and psychomotor mastery, which demonstrates its versatility and usefulness in learning environments.
RQ.1.1	The predominant factors of the use of gamification in the teaching-learning process is based on motivation in problem solving, causing in the student a recognition and sense of relevance for the activity completed, whose process is framed in the challenge and curiosity. Variables that influence students to have a better perception of gamification and/or serious games in the educational process, generating an intrinsic motivation from the cognitive approach.
RQ.1.2	The main benefits of gamification in the educational process is to allow the use of various resources and tools in the classroom that will help teachers to customize activities and content according to educational needs, achieving the learning objectives, motivating students to carry out an educational process that encourages commitment and teamwork that substantially improves academic performance, enjoying learning in synergy with games and serious games.
RQ.1.3	The literature review allows comparisons between games, serious games and gamification, although the games are focused directly on entertainment but not on learning, on the contrary in serious games learning is the main objective and in these the fun is not the purpose, from this perspective, gamification has an important relationship between games and serious games between fun and motivation for learning used in formal higher education, where the characteristics of games and serious games are combined to form an enhanced set of features called gamification.

4. Discussion

The application of gamification is not easy; it requires adequate preparation and a particular emphasis on content. In the case of the teacher, he/she must have adequate knowledge of pedagogy and technology to elaborate in detail and with cohesion the design of the course, generating content and support materials, but its implementation must be well carried out to ensure student understanding (Hidalgo, 2018).

In the same way Espinosa, (2016) states that gamification can create activities involving students in different subjects, forcing them to interact and at the same time learn for their own decision making, breaking the paradigm of the traditional classroom that is still used in higher education, where the teacher guides, talks for hours and the participants take notes (Vélez-Osorio, 2016).

The study has identified the main predominant factors for the use of gamification in the teaching-learning process and this is based fundamentally on motivation, deductions that are corroborated by Van Gaalen et al. (2021) who states that technology-mediated gamification encompasses a wide variety of theoretical and empirical knowledge, driven by a diversity of practical motivations, in the same way Gómez (2019) affirms that teachers who are initiated in this emerging and potentially disruptive methodology, face the application of the ludic elements that better activate the motivations of the students/players, however its application must have a good planning of the gamified activity in order to meet the educational objectives (Buckley et al., 2017).

The didactic strategy mediated by gamification and TIC is changing the teaching-learning process, now, university students prefer dynamic classes but without losing important content and information; guiding teachers also perceive a better performance of their students, when it involves gamification with technological and practical support.

Within this perspective, one of the difficulties for teachers is the lack of consistency of the elements of pedagogy, since not knowing how to properly apply the gamified strategy, the teacher can generate high levels of frustration in their students, which in the short and medium term leads to situations of student dropout (Corchuelo Rodriguez, 2018).

The gamification applied correctly, will cause improvements in academic performance, promoting active learning based on experiences and reflections individually or in groups, this depends on the activity and the difficulty proposed by the teacher (Ballén-Duarte et al., 2016), In the same way according to Kapp (2012), mentions that through this technique can be achieved several types of knowledge such as: declarative, conceptual, regulated, procedural, soft skills, affective and psychomotor domain, which demonstrates its versatility and usefulness when including it in learning environments.

In this aspect, Acosta-Medina et al. (2021) establishes that it is necessary to take into account the ethical management immersed in the design and implementation of gamified didactic strategies, respecting the personal characteristics of the students, in order to avoid inappropriate contents related to age or culture. Regarding the technological competence of teachers, the presence of low competencies in the use of technologies that dynamize the educational exercise in the classroom is identified due to generational differences in the skills for handling digital devices (Samad et al., 2019).

Another important point of the study shows that intrinsic motivation in university students is a very important factor in the application of gamified strategies in the educational process developing cognitive skills, results similar to those of Rodríguez-González et al. (2021), who relate gamification with emotional intelligence, because it directly influences the student's university education, generating

interest and initiative to self-regulate their learning. The influence of motivation in university study helps to link new knowledge with the already acquired, through rewarding experiences that occur in the course of a didactic class. Thus, Perez & Rivera, in their study, determined that the application of gamification in the teaching-learning process has a positive influence on the teaching-learning process, with a correlation between motivation and academic performance.

From this perspective, it can be affirmed that motivated students improve their self-concept by being competent in recognizing and controlling their emotions, managing to create an environment of affinity with their peers or adversaries when they are in a learning activity with gamified resources, findings that are corroborated by Petrides et al. (2007) & Rodríguez-González et al. (2021).

The literature has demonstrated the existence of significant changes in the teaching-learning process by integrating conventional or face-to-face learning and virtual learning, generating the hybrid model or bLearning that when applied with problem-based learning combined with gamified didactic strategies and mediated by technology will allow effective and efficient learning, this synergy of pedagogical, technological and curricular aspects will achieve technological innovation in education (Hidalgo-Cajo & Gisbert Cervera, 2021).

Gamification is undoubtedly gaining attention and acceptance in higher education practice in different areas, however, many authors consider the possibility of conducting more research on the application of gamified learning and the development of strategies and models that improve and innovate the teaching-learning process and become an attractive alternative that responds to the interests of students and teachers through the possibility of learning while playing (Hunter & Werbach, 2012).

5. Conclusions

The relationship between intrinsic motivation and the use of gamification contributes to improve the learning results of university students in a proportional way, through the development of didactic experiences and emotional intelligence, generating positive emotions, interest and personal initiative to perform their academic tasks in an environment of personal satisfaction.

The benefits generated in higher education students, by using gamification as a methodological tool, influences learning, which consists of exchanging information with the teacher, through didactic activities proposed in academic platforms, improving academic performance thanks to the increase of intrinsic motivation and the commitment that exists in applying this tool as a concrete experience.

The success of the educational process mediated by gamification depends on the adoption and management of TIC by the teacher who guides the teaching-learning process, with tools that can be used personally or with educational institutions that provide various courses to their students through their learning portals, in the literary analysis was found, tools such as: *PetAttendToClass; Kahoot; MOODLE* among other; which has several options to run activities and gamified resources, it is important to clarify that these tools do not require programming knowledge or a technical language.

Games are activities that are present since childhood and have currently become a topic of interest at the educational level, in the same way serious games and gamification are tools that allow students to learn by doing, achieving friendly and motivating learning environments, without doubt gamification in synergy with the characteristics of games and serious games allow learning from the correlation between fun, motivation and learning.

As for future work, it would be interesting to apply and analyze the experience in other university institutions in areas such as mathematics, physics, among others, in terms of the acquisition of

knowledge content and emotional performance of students throughout the experience should be analyzed and evaluated with a view to improving their skills.

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