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*Translated from the original in spanish*

**Original article**

## **Gamification as a didactic resource for university Physical Education classes**

### **La gamificación como recurso didáctico para las clases de Educación Física universitaria**

### **A gamificação como um recurso didático para as aulas de Educação Física universitária**

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## **ABSTRACT**

Gamification is a learning technique that transfers the full potential of games to the educational field to improve the results of students in class, it consists of transferring the mechanics of games to other daily practices, which allows turning routine activities into a playful learning process and promotes the natural way of learning. The research that is presented tried to show an experience of gamification as a didactic resource in Physical Education classes, in the students of the University of Guayaquil. The



documentary review, observation and survey were used as scientific methods, which facilitated knowing the behavioral, cognitive and motivational behavior of the university students studied, as well as drawing recurrent methodological guidelines from gamification, which caused significant changes in the educational context from Physical Education, both personalized and group.

**Keywords:** University context; Physical Education; Gamification.

## RESUMEN

La gamificación es una técnica de aprendizaje que traslada todo el potencial de los juegos al ámbito educativo para mejorar los resultados de los alumnos en clase, consiste en trasladar la mecánica de los juegos a otras prácticas cotidianas, lo que permite convertir las actividades rutinarias en un proceso lúdico de aprendizaje e impulsa la forma natural de aprender. La investigación que se presenta pretendió mostrar una experiencia de la gamificación como recurso didáctico en las clases de Educación Física, en los estudiantes de la Universidad de Guayaquil. Se utilizó la revisión documental, la observación y la encuesta como métodos científicos, los cuales facilitaron conocer el comportamiento conductual, cognitivo y motivacional de los universitarios investigados, así como trazar pautas metodológicas recurrentes desde la gamificación, lo cual provocó cambios significativos en el contexto educacional desde la Educación Física, tanto personalizados como grupales.

**Palabras clave:** Contexto universitario; Educación Física; Gamificación.

## RESUMO

A gamificação é uma técnica de aprendizagem que transfere todo o potencial dos jogos para o ambiente educativo para melhorar os resultados dos alunos nas aulas. Consiste em transferir a mecânica dos jogos para outras práticas cotidianas, o que permite converter atividades de rotina num processo de aprendizagem lúdico e encoraja a forma natural de aprendizagem. A investigação aqui apresentada visa mostrar uma experiência de gamificação como recurso didático nas aulas de Educação Física para estudantes da Universidade de Guayaquil. A revisão documental, observação e inquérito foram utilizados como métodos científicos, o que facilitou o conhecimento do comportamento comportamental, cognitivo e motivacional dos estudantes universitários investigados, bem como o rastreio de diretrizes metodológicas recorrentes a partir da gamificação, o que provocou mudanças significativas no contexto educacional a partir da Educação Física, tanto pessoal como grupal.

**Palavras-chave:** Contexto universitário; Educação Física; Gamificação.

## INTRODUCTION

Gamification bursts into as a timely tool to motivate content development and classroom participation ; regarding learning, its use provides a great opportunity to work on aspects such as motivation, effort, loyalty and cooperation, within the school environment, as *Reyes et al., (2020)* refer. It is an element of exceptional motivation for both students and teachers, allowing the level of existing conflict to be reduced, increasing the



atmosphere of the environment and turning the class into a space of greater comfort, which is why it positively transforms training centers.

In addition, it offers the opportunity to interact with an experience and live it through the game, so that the user pays attention, is motivated and can reinforce what has been learned in class, since it activates attention and emerges as an alternative to perfect traditional teaching schemes. It has become a process of literacy in digital competence for the appropriation of technological resources and their incorporation into learning contexts.

Gamification as a didactic resource promotes motivation, creativity, spontaneity, fun and student commitment. **Cascantes and Granados (2018)** highlight that it incorporates game design elements to take advantage of them in the teaching-learning process, but these are not used by themselves, but rather some of their principles or mechanics are taken, such as points, incentives, narrative, feedback, recognition or the freedom to make mistakes as means to generate meaningful learning.

For **Llopis and Balaguer (2016)**, when education is gamified, the main elements and characteristics of games are brought to the classroom to involve the student and offer them a way of learning that is closer to their language and their way of understanding the world. These authors emphasize that the user must be considered the center and reason for the process, and, therefore, students must feel fully involved and have fun while achieving educational objectives within the process.

For Higher Education, this didactic resource activates the search for a high academic quality that generates invaluable professional skills, which facilitates the formation of solid knowledge with abilities and skills in the student's professional field; but above all attitude and human values (**Alonso et al., 2019**). These professionals participate in a permanent training process that takes place in the conditions of new and complex scenarios, which require modernizing and intensifying new teaching and learning methods (**Pourghaznein et al., 2015**). As a result, individuals are able to develop continuous training throughout their lives and maintain a high level of employability (**Roig et al., 2011**).

Gamification in higher education can provide students with better opportunities to develop engagement skills, increasing their stimulation and heightening their interest in what they are learning. Hence **Topîrceanu (2017)**, **Molano et al., (2019)** and **Calabor et al., (2018)** agree that the more active the student is in their own learning, the better results can be expected from the training process.

Gamification within learning consists on the use of game dynamics developed in non-game environments, these allow working on aspects such as motivation, effort and cooperation within the school environment, which stimulates students, in such a way that leads to an expansion of their knowledge (**Prieto, 2020**). Teaching proposals based on gamification constitute an excellent pedagogical tool, with training objectives of achieving attitudes and aptitudes in students, similar to those expected from competition-based models; but in its case, acquired within a didactics of challenges and representations. In this way, it can be incorporated into educational models as an auxiliary element that favors the formation of competencies or comprehensive results, worked from the fun and participation of the student (**Hernández-Horta et al., 2018**).



In this same order, there are authors who establish gamification as the strategy of using the game for other purposes than pure entertainment, focused on achieving objectives with the application of playful tools. In the educational case, a gamification of learning can be defined, where games seek to influence the training of students, such is the case of [González-Acosta et al., \(2020\)](#). For this reason, it is important to enable increased student participation in the collective construction of knowledge, interactive projection in the classroom, greater motivation towards learning, depending on the scope and progress of the curricular lines established for their age and level of education. scholarship.

According to [Sánchez-Pacheco \(2020\)](#), in Ecuadorian higher education, as in other areas, its use is still incipient, since the controversy surrounding the issue is still considerable, however, it comes to combine efforts with other proposals of the same distance, in the attempt to magnify some of the learning problems of individuals, which lead them to commitment and motivation in the educational environment.

In this society, education must accompany contemporary evolution, establish new values, make new discoveries, accept new ideas, which allow a suitable space for learning, which designs significant styles and stimulates individuals for their personal and intellectual development.

It is urgently needed the adoption of new strategic actions that contribute to applied teaching in educational institutions, responsible for cognitive irradiation, in a classroom context, which considers face-to-face and virtual learning scenarios, fundamentally focused on the use of alternative modes such as images, videos and audios, which can help in the transmission, absorption, retention and transformation of knowledge, what allows the prosperity of the experience.

In the context of Physical Education, reference studies were found where those of [González et al., \(2018\)](#) and [León-Díaz et al., \(2019\)](#) stand out for this research, which allow describing and interpreting reality in order to understand its meaning and its possible applications at the school level, as well as the impact on the process of teaching-learning in the university.

Such reasoning exhibits gamification in Physical Education as a motivating and innovative resource within the subject, which is applied in order to acquire better theoretical knowledge, improve skills and as a reward for the activity that is carried out. The innovative character that it possesses facilitates its practice, due to the motivation that it achieves in the students thanks to its playful component, generating positive experiences, what the teacher seeks is to increase the involvement, responsibility and commitment of the students, and motivate them and encourage them to his own upgrading.

The foregoing made it easier to carry out a study on the students who attend the Physical Education subject at the University of Guayaquil, since despite having the necessary requirements to enter this educational level, their performance is not always correct during the execution and result of this teaching activity, evidenced mainly in the lack of attention and motivation, as well as the lack of commitment to the teaching tasks oriented from the subject, their main motivation being video games from their computer, tablet or mobile. That is why, the objective is to show an experience of gamification as a didactic resource in Physical Education classes at the University of Guayaquil.



## MATERIALS AND METHODS

The research is contextualized at the University of Guayaquil, with the participation of 187 students who participate in Physical Education classes, which respond to the curricular objectives of teaching, emphasizing autonomously participating in various bodily practices, having knowledge (bodily, conceptual, emotional, motor among others) that allow them to do it in a healthy, safe and pleasant way throughout your life. However, as relevant information, it should be stated that they show little interest in the practice of physical activity, which includes all participants of this subject in their curriculum. The study was carried out in the 2019-2020 season (Table 1).

**Table 1.** - Representation of the sample

Total	females	Male	Average age
187	89	98	19.6 ± 1.8

The results obtained in the initial diagnosis made to the students who enter the house of studies are shown, a descriptive study was formalized to the selected population and that they participated in the Physical Education classes in the stage. The analysis was done as a group and in a personalized way, to provide more complete information and to allow making the pertinent adjustments in the planned curricular programming for the stage.

A documentary review of the Higher Basic General Education Curriculum (BGU) was carried out, with emphasis on the contribution of the Physical Education area curriculum of this sublevel to the general objectives of the area, to the objectives of the Physical Education area curriculum, the matrix of skills with performance criteria for each curricular block, that facilitated the production of information to formalize an observation and define from the environment the recurrent events in the students.

The observation was made to eight randomly selected teaching activities, the most relevant was the traditional form of teaching direction. All the activities observed correspond to the Physical Education teachers of the institution and in their entirety, they were directed by the teacher responsible for the activity in his leading role.

It should be noted that to assess the indicators established for observation, quantitative and qualitative values are used that allow knowing the state of the object of the research.

Meanwhile three dimensions are defined that range from the Intuitive-experiential, which reflects the level of knowledge that students should have about the contents associated with Physical Education, in correspondence with the objectives of the degree and the experience acquired by the years of studies and/or their sports practice, the executive-operational dimension that radiates the relationship of the content with the personal, group and institutional needs, as well as the link of Physical Education with its mode of didactic action, and in this same order proceeds the Interpretive -behavioral dimension, where the way in which the student acts in the pedagogical-sports context is valued and which is verified from the evaluation and its expression in the student's performance.



The previous dimensions make it possible to assess the development achieved and at the same time establish the indicators and evaluative criteria, from which the questions shown in each instrument emerge.

The survey was applied to the students with the objective of knowing the level of intrinsic motivation that emphasizes the personal meaning and its incidence in the use of Physical Education.

For the evaluation of the data obtained, descriptive statistical methods were used, using the SPSS version 20 package.

## RESULTS

The documentary review carried out for this research revealed that the designed curriculum expresses the demands of an educational project which purpose is to promote the development and socialization of the new generations; that reflect the educational intentions of the country, establishes guidelines to make these intentions a reality and verify their effectiveness. Its solidity, coherence and contextualization should be highlighted, ensuring attention to learning needs, together with resources that ensure the minimum conditions necessary for maintaining continuity and the realization of educational intentions, guaranteeing quality teaching and learning processes.

However, it records shortcomings in the teaching process that is carried out and that make it impossible to achieve transformations in the training actions of students at this educational level, such is the case that the motivation of the classes does not respond to the pretensions and needs of the students, making decisions about their body based on the recognition of their motor skills (their motor capacities and motor skills), shows a negative treatment of the content of the programs, as well as the emotional links with body practices, in interaction with their peers during their participation in corporal practices.

There is a diversity of criteria on the part of the professors, of how to implement the methodological technical work at the different moments of this educational level and even the objectives are formulated to implement a unique work system, which makes it holistic in relation to the new trends of the teaching-learning process. Such reasoning makes it easier to not comply with the principle of the link between rationality, creativity and the quality of the result.

These arguments admit why that cannot be denied as contemporary reality, technologies, knowledge, the speed of information, the need for knowledge, communication and interactions, the aspirations of individuals, the organization of society, require of a new context for education and learning.

In the search for new trends, the existence of gamification could be deduced as one of the classroom strategies, it proposes to lead the subjects to a situation in the sense that the concept is based on commitment, learning and collaborative education techniques.



The analyzed elements set guidelines for the application of an unstructured observation that reveals the behavioral manifestations of the students in the educational center and their behavior towards Physical Education classes.

Taking into account that humans can respond to the same situations in a very different way depending on the past, way of being, the education received, different types of behavior were experienced, which are shown below (Table 2).

**Table 2.** - Result of behavioral manifestations of the students investigated

Behaviors	Passive	Aggressive	Covert	Adaptive	Social	Conditioned
Total students	42	7	29	twenty-one	28	60

The table shows that 32 % of the students observed present a conditioned behavior, which includes all those decisions that are made based on past experiences and that determine what actions to perform. After seeing the outcome, perhaps from that moment they begin to act differently, not because it is better or worse, simply because they see that the first action had negative consequences (they will stop doing it), although it can also have positive consequences (continue doing it).

In the second order, passive behavior, represented by 22.4 % of those surveyed, where these students are people who avoid conflicts at all costs, although sometimes that means giving up their rights, freedoms, opinions and dignity. Similarly, self-esteem problems are often behind this type of behavior.

It was revealing that only 14.9 % manifest a social behavior, since they reveal actions in order to improve coexistence with other colleagues, respecting the rules of coexistence.

The different behaviors appreciated in the research require the practice of a survey of students in order to know the level of intrinsic motivation that emphasizes the personal meaning and its incidence in the use of Physical Education (Table 3).

**Table 3.-** Motivational characterization of those investigated

Complete disinterest	Successful disinterest
109	78

Among those classified as totally disinterested, those with passive and aggressive behavior and those grouped in conditioned behavior are registered.

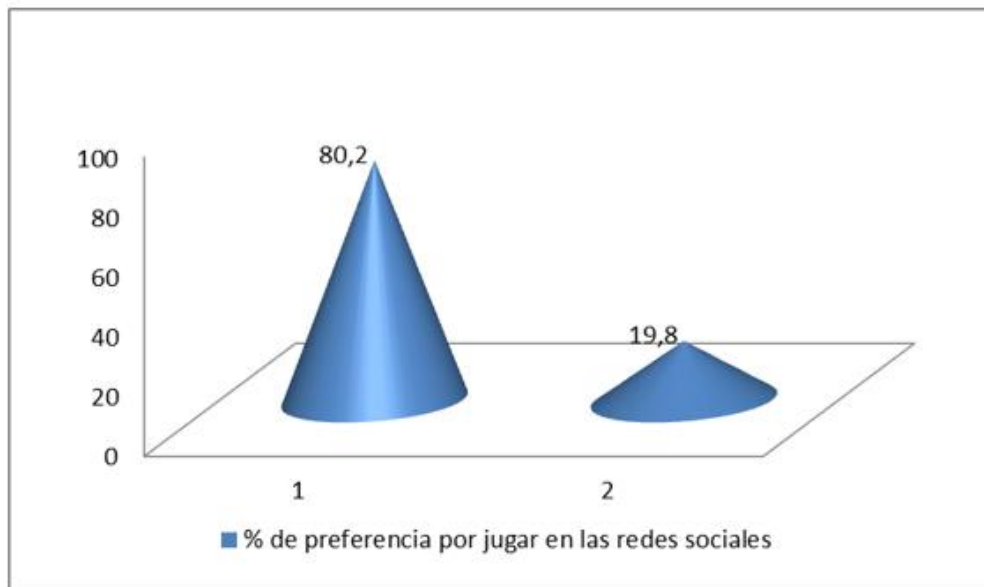
They state that they prefer to stay out of educational events, highlighting that the use of online games that they provide for users is of greater interest, especially for young people, who consume more Internet.

The survey applied to 100 % of the students makes clear their preference for playing on social networks; 150 of those studied, which represents 80.2 % of students, consume





games. Of these, a total of 37 for 19.8 % are considered followers of online games (Figure 1).



**Fig.1** - Result of the survey applied to students

What has been exposed so far shows the need for an educational transformation to reform educational behavior from the use of gamification as a didactic resource in Physical Education classes, in the first-year students of the University of Guayaquil; considering the work with the motor actions, linked to the story that you want to raise to give an outlet to the various sports options where different computer tools can be used.

For the proposal, the inclusion criteria were directed towards systematic participation in classes and the response to the questionnaires presented to solve. Being accepted the 187 participants.

In the first moment of the research, it was explained to all the students identified for the study that a new methodology would be used in the Physical Education subject, based on gamification, it was possible to commit all those involved to the intention of the researchers about the usefulness of gamification in a natural environment, verify its impact and its real feasibility.

ClassCraft educational platform in Spanish was used, which shows some experience in its use in Physical Education classes, where a gamified and collaborative learning methodology is included. This allows the creation of a code for students, for teachers and even for the participation of parents if they wish as part of the team, favoring the application of an active teaching-learning methodology.

The participants formed their own, personal and non-transferable account, which gave them access to create their personalized avatar. The student could choose between one of three characters or roles: Magician, Warrior or Healer. Each of these characters have different powers with which they can help their team.



The teams are made up of the students themselves and on the condition that it is mixed, and has a maximum of 6 members, which must be assigned all existing roles. In addition, all participants must sign the hero's pact, a commitment to accept the rules and decisions of the Grandmaster, in this case it is the role of the teacher, where everyone certified their intervention.

This tool allows evaluating behaviors, conducts and reorient t, in such case attending to the objectives of the curriculum for Physical Education for this level, The progress will be defined through the granting of points defended by its nature, with a maximum of 1080 points to achieve (Table 4).

**Table 4.** - Scale for awarding defended points

XP	Experience Points	They are obtained by positive reinforcement after a behavior and will be used to level up
hp	Health Points	Required to stay in the game and are lost for negative behaviors
PP	Power Points	1 PP is earned when leveling up and is used to buy powers
AP	Action points	They allow to use the powers that have been acquired
gp	Reward	They allow us to customize the character and are obtained by leveling up with XP points

Each character has strong and weak points and different powers. On the one hand, the healer is suggested or chosen by students who like to help others and can heal by restoring their own health points and those of other members of the team. On the other hand, the warrior has a more offensive character so they can lose health points more easily. They can take damage from others and heal themselves. Finally, the magi helps other members of the team by awarding action points and is usually chosen by the student body that does not lose health points easily.

Once the mediation procedure had been organized, in the first week an orientation conference was held with all the participants to explain the functioning of the classes in the following weeks, so that the students could acclimatize with the completion of the different questionnaires and the use of the ClassCraft interface. Next, the questionnaire (CMEF-pre) was administered to the students. During weeks two, three and four, the student received the different practical classes oriented towards psychomotor development and the improvement of physical condition in a safe and healthy way according to the individual and collective needs of the student based on the corporal practices that choose, for nine sessions of two hours each. In week five, after the gamified intervention, the questionnaire (CMEF-post) is repeated.

For the development of classes with ClassCraft, the following levels were established between behaviors and points, both positive and negative, equivalences between points and rewards (Table 5) and (Table 6).



**Table 5.** - Equivalence between behaviors and gamified points

PROCEDURES	XP (+) EXPERIENCE POINTS		HP (-) HEALTH POINTS	
	+135 XP	Class attendance	-10HP	Arriving to class late and/or in inappropriate attire
	+270 XP	Provide constructive criticism	-20HP	Any inappropriate behavior that prevents the class from developing normally
	+540 XP	Actively collaborate in team work	-30HP	Lack of respect for the teacher partner or material
	+1080 XP	Internalize desirable behaviors for the rest of the classmates		

Source: Ferriz, et al., 2019.

**Table 6.** - Equivalences between rewards/punishments and gamified points

REWARDS/ PUNISHMENTS	(+ ) ACADEMIC POWERS		(-) SENTENCES *	
	1080 XP+ 30 AP	5 extra minutes to finish the theoretical exam of the subject	Five minutes less to finish the theoretical exam of the subject	
	1080 XP+ 30 AP	The teacher highlights 50% of the multiple non-true answers in a multiple choice exam question	Edit a short video of the subject	
	1080 XP+ 30 AP	The teacher points to the answer correct on a question multiple choice exam	Delivery of a didactic unit before the month of December	
			Delivery of a model of a center educational before the month of December	

\*Sentences are applied when the student runs out of HP points.

Source: Ferriz, et al., 2019.

For the proposal, the objectives were established according to the demands of the curricular program and the educational needs of the students, these should be given a solution from personalized and cooperative work. The challenges or missions to be met and the rewards for the results achieved were established and piloting was carried out for six months (Figure 2).



**Fig. 2.-** Structure of the proposal



Among the main experiences achieved, it can be mentioned the motivation of 72 % of the study sample to actively participate in the search for and solutions to the proposed games, in just three weeks; as well as the emergence of new proposals designed by teams formed by themselves and that managed to increase the number of students interested in the classes, managing to incorporate 87 % of the students in a period of six months.

In order to verify the existence of significant changes between the results obtained before and after the improvement strategy was implemented, the Wilcoxon marked ranks test was applied, taking into account that the data correspond to an ordinal measurement level, with rank of possible values reduced. Important differences are considered to exist if the significance of the  $\chi^2$  test is less than or equal to the predetermined level of significance,  $\alpha = 0.05$ . The data was processed by the Statistical information system Package for the Social Sciences, Personal Computers (SPSS version 20) for Windows.

## DISCUSSION

The educational profile of gamification conceives an environment where the cognitive, recreated and attractive dividend makes it easier for the student to create, understand and learn or appropriate information in a personalized and collaborative way; hence, what is stated by *Ormazábal et al., (2019)* is admitted regarding the fact that learning through gamification allows students to obtain knowledge about facts, concrete examples of abstract concepts and analytical skills in an environment of procedural experience and decision-making. of decisions; as well as the application of the course content in real life situations.

An interesting aspect for this research was the treatment of the motivation and preference of the students and the fulfillment of the objectives treated in the Curriculum of the higher educational level worked; which on this is in line with the ideas discussed by *Reyes et al., (2020)*, when in their research they also find solutions not only to aspects such as motivation, but also to effort, loyalty and cooperation, among others, within the related to school.

In this same order, the role of the Physical Education teacher and his/her interaction with the student is important, where the latter must assume leadership in the activity, in real contexts, it can even allow the inclusion of the family as a third entity involved during the planned educational process.

The study in educational contexts of Physical Education in university students, allowed to know the benefits of gamification. It was possible to know the type of behavior of the students analyzed and the motivation manifested in the different gamified actions, as well as the significant changes after the proposal was applied. The student's commitment to learning was appreciated, showing the great influence that gamification has as a didactic resource in the cognitive development of students, in the emotions and in the socialization processes that are generated throughout the process.



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**Conflict of interests:**

Los autores declaran no tener conflictos de intereses.

**Authors' contribution:**

The authors have participated in the writing of the work and analysis of the documents.



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