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## Intrinsic motivation and its impact on the academic performance of university students in Ecuador

*La motivación intrínseca y su incidencia en el rendimiento académico de los estudiantes universitarios de Ecuador*

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### Abstract

Education is currently immersed in a changing world, which supports the importance of implementing different strategies that prioritize the interests and encourage intrinsic motivation of students to achieve educational goals through the use of innovative techniques and strategies such as gamification, with the purpose of acquiring knowledge in a more active, participatory, autonomous and dynamic way. In this way, the development of skills and abilities that contribute significantly to the improvement of academic performance will be enhanced. In order to go deeper into this topic, the research was proposed with the objective of developing intrinsic motivation through gamification strategies, evidencing its incidence on the academic performance of students in the second semester of the Pedagogy Career of a university in Ecuador. The study was developed under a quantitative approach, with a quasi-experimental method of correlational type, approaching a sample of 129 students, divided into two groups, a control group with 65 members and an experimental group with 64. The information was collected through the application of a pretest and a posttest that led to the design of a proposal implemented to the experimental group. The main results showed that intrinsic motivation developed with



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gamification activities is positively related to academic performance, since it is a fundamental contribution to the integral preparation of university students.

## Keywords

Academic performance, strategies, gamification, intrinsic motivation, university education.

## Resumen

La educación actualmente se encuentra inmersa en un mundo cambiante, lo que sustenta la importancia de implementar diferentes estrategias que prioricen los intereses y fomenten la motivación intrínseca de los estudiantes para alcanzar las metas educativas mediante el uso de técnicas, y estrategias innovadoras como la gamificación, con el propósito de que el conocimiento sea adquirido de manera más activa, participativa, autónoma y dinámica. De esta manera, se potenciará el desarrollo de capacidades y habilidades que aporten de forma significativa a la mejora del rendimiento académico. Para profundizar en este tema se planteó la investigación con el objetivo de desarrollar la motivación intrínseca a través de estrategias de gamificación, evidenciando su incidencia en el rendimiento académico de los estudiantes del segundo semestre de la Carrera de Pedagogía de una universidad del Ecuador. El estudio se desarrolló bajo un enfoque cuantitativo, con el método cuasiexperimental del tipo correlacional, abordando una muestra de 129 estudiantes, divididos en dos grupos, uno de control con 65 integrantes y otro experimental con 64. La información se recolectó a través de la aplicación de un pretest y un postest que propició el diseño de una propuesta implementada al grupo experimental. Los principales resultados mostraron que la motivación intrínseca desarrollada con actividades de gamificación se relaciona positivamente con el rendimiento académico, pues es un aporte fundamental a la preparación integral de los estudiantes universitarios.

## Palabras clave

Motivación intrínseca, estrategias, gamificación, rendimiento académico, educación universitaria.

## 1. Introduction

Motivation is "an important element to be considered in the teaching-learning process, focused on encouraging the realization of creative activities, through a fully conscious action" (Alemán et al., 2018, p. 1257). Therefore, Castro et al. point out that educational practice should be oriented towards the development of interest as an elementary factor for the acquisition of knowledge, a fundamental aspect in training, since it has been estimated as one of the most effective processes in the achievement of knowledge, empowerment of skills and abilities, the formation and strengthening of persistence, and permanence for the graduation of students as future professionals (Castro et al., 2020, p. 31).

In general terms, motivation can arise through two processes: intrinsic or extrinsic. In this specific case, intrinsic motivation is addressed, considered as one of the most important factors that drives a person to take on certain actions and persevere in their achievements, continuing to perform them until previously established goals and objectives are reached. According to Fischer et al. (2019) it is the factor that presents an "inherent tendency in the search for novelty and challenge, to develop and exercise one's abilities, to explore and learn, which leads to the achievement of purposes in accordance with one's own desire" (p.



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2). That is, this type of motivation is the one that allows performing an activity for the satisfaction of achieving it, without obligation or external reward.

What according to Virtanen et al. (2018) is what focuses a person with a strong intrinsic motivation to be "more willing to implement different cognitive strategies to implement the actions required in the advancement of the learning process, leading to the achievement of high levels of commitment and self-regulation" (p. 985). That is to say, through intrinsic motivation one seeks to achieve a purpose, in this case aimed at completing a university degree, demonstrating personality in the achievement of goals, aspirations and academic objectives. In itself, intrinsic motivation affects the desire to learn, evolve, improve and increase learning and knowledge, against which one must assume one's own initiative when giving assertive answers in the resolution of problems and every situation that arises.

Therefore, developing intrinsic motivation in students promotes creativity, curiosity, effort, and continuous participation, and fosters the consolidation of knowledge, satisfaction for the achievement of objectives and the success obtained. It is important to generate a link between internal motivation and academic performance, that is to say, that its function is elemental for the achievement of the effort to enhance the students' interest in their professional training and personal development.

However, considering that it is a fact that motivation influences the achievement of learning, it is vital to understand that the lack of intrinsic motivation is determinant for the achievement of educational success or failure of students, to the point that one of the objectives of teachers is to achieve motivation, since it is evident that the lack of it is one of the main causes to be assessed in the face of student failure, specifically when it is based on the gap that is established between the actors of the educational event. However, according to Alemán et al. in the university environment, the relationship between teachers and students is usually distant and impersonal, the approach within this educational system does not allow focusing on the subject who learns, but rather university training tends to emphasize the importance of learning, and the interaction between the teacher and the curricular contents (Alemán et al., 2018, p. 1261). This model is currently developing in a society whose purpose is immersed in a globalizing process, which faces interests of a quantitative nature and the technical management of information, which leaves aside the system of construction and transmission of knowledge in a way that recognizes and values the learner, who is provided with a more humanized experience.

In other words, the dynamics of the school context are of utmost importance for the academic and personal success of students. The quality of the relationships established within this environment will influence motivation, commitment and performance in the learning process. Therefore, it is essential that teachers establish close ties with their students, based on mutual respect, empathy and trust in order to offer them the necessary support and foster their integral development.

In this way, a positive and enriching learning environment will be promoted for the students. Intrinsic motivation is definitely influenced by the interaction of several factors that maintain a specific function and where this type of interactions and punctual relationships can generate unpredictable results. Therefore, through intrinsic motivation, students can be driven to try harder, to actively seek knowledge, and to persevere through challenges. This supports the importance of cultivating this type of motivation in the classroom to promote successful learning.



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In this sense, paraphrasing Abreu and De la Cruz, it is important to know the level of intrinsic motivation of students, since it is possible to promote the implementation of effective interventions to strengthen ethical and moral values that encourage and promote their intellectual and emotional development. What is assumed as an essential determinant in the integral formation of students towards a successful graduation from the different university careers as future professionals (Abreu and De la Cruz, 2018, p. 478). That said, according to Lorente, it can be observed that the development of intrinsic motivation is easier to achieve when it is associated with personal interest. For this, it is necessary that they are aware of why they learn, what is the need to learn and how they can apply the knowledge in a practical way, not only as future professionals, but beyond this, in the daily life and the context in which they develop (Lorente, 2019, p. 11).

Bernate and Guativa point out that in the area of pedagogical training, where this work focuses, it is essential to develop intrinsic motivation in students, so that they can be formed within theory and practice, adopt, set high goals, acquire scientific knowledge, promote and contribute to the improvement of the quality of life in a particular way, community, and before society in general, within the process of university training (Bernate and Guativa, 2020, p. 151). In addition to this, especially in higher education, "technology is increasingly merging with pedagogy by incorporating the use of digital resources, adopting student-centered training models" (Yigzaw et al., 2019, p. 2). On this, more tools, techniques, and strategies have been used with the purpose of contributing to the improvement of the formative and educational process at this level, leaving behind practices typical of traditional systems, developing processes where the student is the real protagonist, all implemented under updated, innovative, dynamic, creative and interactive methods.

Thus, Revelo mentions that the educational processes carried out in the different university training careers should lead and be an example of development, and progress of future education professionals, showing them the ways in which they can integrate new methods, resources and teaching strategies to the educational processes (Revelo, 2018, p. 9). For his part, Carrión mentions that this is why it is expected that the activities designed under the gamification approach manage to provide the student with tools and strategies that allow them to be considered as innovative proposals, as a real and practical teaching alternative, in order to encourage and promote the intrinsic motivation of this student population in improving academic performance (Carrión, 2018, p. 13).

Gamification as a didactic resource proposes the purpose of guiding participants to the achievement of an objective through the modification of behaviors, propitiating the acquisition of new knowledge, as well as improving skills and abilities, helping them to responsibly assume the performance of the proposed activities (Smiderle et al., 2019; Trejo, 2019). To achieve these purposes, participants will complete the previously established challenges, following the rules indicated at the beginning of the game, which awakens motivation and interest, and promotes the achievement of the expected results.

It is relevant to indicate that, within the framework of gamification, feedback is provided, which reinforces learning, and thus productivity and academic performance (Heredia et al., 2020; Reyes and Quiñonez, 2020). It is therefore undeniable, as Oliva states in his research, that the effect of this strategy on the involvement and active performance of students is highly significant, since it allows them to feel emotionally motivated to participate in the development of the activities planned through these resources and the results of the processes leading to the acquisition of more meaningful, practical, effective and sustainable learning (Oliva, 2018).



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Consequently, from these approaches a series of research questions arise: how does the development of intrinsic motivation through gamification activities impact on the improvement of academic performance of university students, how does a gamification activities guide stimulate the development of intrinsic motivation in the improvement of academic performance of university students, what evaluation mechanisms allow assessing the impact of the proposal designed for the development of intrinsic motivation through gamification in the improvement of academic performance of students, and what are the evaluation mechanisms that allow assessing the impact of the proposal designed for the development of intrinsic motivation through gamification in the improvement of academic performance of students?

The purpose of this article is to provide answers to these questions. The objective of the research is to determine the importance of developing intrinsic motivation through gamification strategies, evidencing its impact on the academic performance of students in the second semester of the Pedagogy Career of the Language and Literature, Languages and Psychopedagogy majors of the Faculty of Educational Sciences, Humanities and Technologies, Riobamba, Ecuador. The aim is to strengthen the intrinsic motivation of the student population, considering that this factor should be a primary requirement to be developed in students, since it generates commitment, allows greater social participation, increasing awareness for the achievement of knowledge and particular needs. All this can contribute to improve learning, and raise academic performance through the acceptance or rejection of the established hypothesis, to prove that the development of intrinsic motivation enhanced by gamification affects the academic performance of students.

On the other hand, according to Choudhury and Pattnaik, the greatest positive impact of the project falls on the students, in whom it is expected to develop intrinsic motivation through gamification. Gamification as a strategy that focuses on the involvement and participation of students, since the purpose is to help them feel more emotionally motivated and participate in the activities offered through gamification, in order to achieve more meaningful learning (Choudhury and Pattnaik, 2020). In this sense, gamification plays a key role in maximizing the involvement, involvement and integration of students in the learning process. Additionally, it is expected that with the development of the project, university professors will find new and innovative alternatives in terms of activities and strategies to be applied in the classroom and that students will work in intuitive and motivating learning spaces, where they can learn autonomously and independently, participating in each of the activities proposed, providing effective answers and solutions to the challenges presented.

As for the limiting aspects, it could be considered that students assume little relevant activities and little commitment when participating in the implementation of gamified activities that could be perceived more in relation to lower educational levels than the one they are at. Nevertheless, some tools and tasks were found to be relevant and appropriate to work with this type of population through gamification. These tools are perceived as useful and beneficial for the development of intrinsic motivation, contributing to the improvement of the academic performance of university students, who were actively involved and participated in them.

According to the criteria required for the realization of a research work, the following sections are developed: in section 2 the literature review is presented, which consists of the review of bibliographic sources related to the research topic. Section 3 details the methods and materials used to develop the research. Section 4 presents the results of the research.



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Section 5 details the discussion of the results. Section 6 establishes the conclusions according to the results obtained.

## 2. Literature review

### 2.1 Intrinsic motivation

Motivation is what drives people to achieve certain actions and persist until they reach the goals and objectives previously established. In this sense, different types of motivation are found, such as internal and external, proceeding to discern in internal motivation being the case under study, which, according to Barrientos et al., (2019) refers to "the inherent and natural tendency that leads to the search for novelty and challenge, to develop and exercise one's skills, to explore and learn, which leads to do something according to one's own desire" (p. 3). In other words, the objective of intrinsic motivation is to achieve a goal, which inherently produces satisfaction and emotional overcoming, in this case it is urged that students complete professional training at the university level, showing a level of self-development, and of personality in the achievement of one's own goals, desires, aspirations and objectives.

For Fisher et al., (2019) a person with a strong internal motivation "can better apply different cognitive strategies, practically perform the necessary activities to promote learning, allowing high commitment and self-regulation" (p. 74). Additionally, as stated by Garcia and Pintrich (1994, as cited in Gonzalez, 2018), "high intrinsic motivation supports the mastery of appropriate learning strategies" (p. 4). As such, it emphasizes the desire to learn, develop oneself, improve learning and knowledge, in the face of which one must take the initiative to give convincing answers, solve problems and make decisions in the face of any situation that arises.

Extrinsic motivation, from the perspective of Fonseca et al. (2018) "is considered the main pillar of gamification, due to the fact that the game supports different spaces within the educational environment (classroom, teachers and educational community in general) that must be motivated to be effective in the process" (p. 25). Therefore, fostering the development of intrinsic motivation in students to enhance curiosity, effort and continuous participation, contributes to enrich knowledge and promotes satisfaction in the achievement of objectives and success. Given which, gamification represents a fundamental role in the maximum participation of students; likewise, the teacher's intervention is considered important in the creation of a close link between intrinsic motivation and academic performance, that is, his role is elementary to reinforce the interest in training in the specialty in which he is being trained, that he is trained, his professional field and personal fulfillment.

### 2.2 Gamification as a strategy for the development of intrinsic motivation

"Gamification facilitates peer-to-peer interaction involving a specific system of rules that defines a path or channel to follow to achieve certain results" (Corchuelo, 2018, p. 17). All this contributes, among other aspects, to the development of motivation, constant feedback, engagement and interest of students in the contents and completion of their tasks, which promotes significant, self-regulated and independent learning, which contributes to the improvement of school performance (Aranda and Caldera, 2018; Smiderle et al., 2019). In other words, gamification supported by the integration of technology-mediated game mechanics promotes the development of intrinsic motivation and student engagement, which naturally impacts the increase in academic performance.



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The concept of intrinsic motivation associated with game design is exposed by Manzano et al. (2022) as "that in which the experiences lived by the subject are articulated and new internal and external perspectives are offered for the redefinition of these processes, from the stimulation of creativity, independent thinking and well-being of the player" (p. 30). From which four axes of motivation emerge: competition, learning, escape from reality and social interaction.

The intrinsic motivation raised by Fonseca et al. is proposed as the fundamental basis of gamification activity, considered as a game action that supports spaces related to pedagogical practices and the interactions that occur in these, where the main actors in these areas must be motivated, so that they can function effectively in the formative process (Fonseca et al., 2018). In this regard, Ortiz et al. confirm that gamification is a methodology that promotes motivation, which is based on two elements that emphasize the intrinsic of each individual, so it promotes the development of skills and virtues of those who participate in the development and implementation of playful-educational activities within a collaborative and interactive work in which the gamified action itself places the player at the center of the system, where the motivation of the participant and his own involvement with the other participants determines the outcome (Ortiz et al., 2018).

### 2.3 Intrinsic motivation developed through gamification strategies and academic performance.

The concept of gamification exported to the field of education "materializes when important contextualized didactic projects focused on promoting the transformation of teaching-learning are put into practice" (Álvarez and Polanco, 2019, p. 2). About which, Aranda and Caldera state that this resource, in addition to being used in a non-playful context, is constituted as a motivational mechanism that promotes concentration, effort and other positive values, allowing the student to benefit from their learning experiences, which favors the educational process to be more effective, dynamic, active, participatory and collaborative (Aranda and Caldera, 2018).

In other words, the purpose of gamification as a didactic and methodological resource is always aimed at achieving learning, that is, its objective is "to generate changes in behavior and learning through positive experiences that promote the development of intrinsic motivation" (Carrión, 2018, p. 4). This with the aim of achieving better academic results, assimilating knowledge, as well as certain skills and abilities, among all the purposes that lead to the development of intrinsic motivation, influencing the improvement of academic performance.

In this direction, Fuentes et al. state that the application of gamification as a methodology involves an active pedagogy that includes in its development various competencies that require intellectual and affective processes, the exchange of attitudes, participation, collaborative learning and knowledge that promote creativity and imagination. Therefore, gamification approaches and connects students to the acquisition of knowledge in a different, playful and creative way, even helps to release and prevent behaviors that hinder or limit the progress and achievement of goals, purposes objectives previously established (Fuentes et al, 2018). Therefore, they argue and corroborate that gamification is "a learning method that modifies the mechanics of the game in the pedagogical-professional field, to achieve better results, among them, a greater acquisition of knowledge, as well as, an improvement in the reward of specific actions" (Manzano et al., 2022, p. 3). Therefore, the gamification model is really functional, and manages to raise the levels of intrinsic motivation of students, encouraging and strengthening the spirit of improvement.



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Currently, these resources use various mechanical techniques that have been extrapolated to replicate gamification to the educational process (Smiderle et al., 2019). Thus, from a pedagogical point of view, this strategy emphasizes the constructive strengthening of knowledge and attitudes, improves student performance and develops intrinsic motivation, enhancing skills that allow a performance in an environment immersed in constant transformation (Aranda and Caldera, 2018). Similarly, by applying gamification to education, the aim is to create meaningful and interactive learning experiences that overcome demotivation, encourage behavioral changes and open spaces for reflection. In this regard, it is mentioned that:

when gamified, the user (student) experiences his own story, in the processing of which he actively participates, as this resource becomes an environment where multiple mechanisms and resources can be realized with which he can interact freely and spontaneously, through the social system provided by the game (Aleman et al., 2018, p. 1257).

According to this approach, "gamified processes (ludic/games) offer great potential in improving academic performance" (Fuentes et al., 2019, p. 18). In such cases, it is important that the appropriate gamification mechanisms containing a motivational, social and interactive element, where the participants involved (students) devote all their energy and interest to the proposed game.

In which it is important to raise a previous objective, convert learning skills, and knowledge into a game, create the challenges themselves, define clear game rules and a reward system, organize a motivational competition and reinforce the level of difficulty in an increasing way according to the acquired mastery (Virtanen et al., 2018). For which, certain steps to be implemented must be established, with which the functioning of gamification in the classroom is sought and, of course, in the achievement of the previously established objective, as well as the required learning in function to improve academic performance. To these stages or important parts of the game is added the feedback process, which generates the union between the correction and overcoming of errors through repetition, so that the student recognizes and accepts the error as a natural factor that can be corrected or rectified, in order to continue until the achievement of the final result, the outcome or the receipt of the reward, which would lead to the achievement of the goals and objectives of the educational process, as well as the improvement and increase of academic performance.

### 3. Methods and materials

The research was developed under a quantitative approach, in which "the collection of data and information is carried out based on measurements and numerical and statistical analysis with the application of an instrument, to establish patterns of behavior" (Hernández & Mendoza, 2018, p. 6). According to the design, the quasi-experimental method was considered as an approach in which the extent to which a treatment, intervention or strategy achieves the intended objectives is tested (Hernández et al., 2014). There the subjects are not randomly selected, so it is considered useful to study phenomena in which the situations cannot be totally controlled, even when the purpose is to have a greater possible control of some of the groups already formed, in the verification of the incidence of some of the variables under study on the other.

Similarly, the research was developed as a correlational study in that the phenomenon under study was observed, intervened and analyzed, with the purpose of determining the relationship between the variables subject to analysis, verifying the incidence of one of



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these variables against the other (Ramirez and Lugo, 2020). In this case, we proceeded to approach a group to observe and analyze the object of research, to determine the incidence of intrinsic motivation developed through gamification strategies in the improvement of academic performance of students in the second semester of the Pedagogy Career in the mentions of Language and Literature, Languages and Psychopedagogy of the Faculty of Educational Sciences, Humanities and Technologies, Riobamba, Ecuador.

The unit of study was constituted by a population assumed as finite and considered significant, the census sample was taken because the students enrolled in the second semester were chosen, all of them have direct contact with the auditor, the totality of the sample was selected, composed of 129 students enrolled in the second semester of the Pedagogy Career of the National University of Chimborazo of Ecuador, located in the age group from 18 to 28 years old, of both sexes, according to the enrollment records provided by the secretary of the educational institution in question.

The selection criteria were based on the fact that they were students who presented low motivation to carry out school activities, which is considered a barrier that limits academic performance. The sample was selected intentionally, and at the convenience of the researcher, as a teacher of that area and career; as well as in line with the requirements of the ongoing research development (Oberti and Bacci, 2020).

This sample was divided into two study groups: the so-called control group made up of 65 students and the experimental group made up of 64 students, this selection being made with random probability sampling. It should be noted that the experimental group was intervened with the designed proposal, based on gamification activities for the development of intrinsic motivation in the improvement of the academic performance of the students who made up the sample under study. On the other hand, the control group was not approached by the designed proposal, who continued with the development of the classes in a normal, classical or traditional way. The binding characteristic was that all the students were enrolled in the Pedagogy program of the university under analysis, to which the researcher had access because of the professorship he teaches. From there, information was taken on the evaluation techniques of those students in their second year at the time of the research, from whom data were collected through the implementation of the pretest and posttest applied for this purpose. For which, once the sample was determined, the informed consent link was provided, so that each of the members of the sample declared their free and voluntary participation in the research, in accordance with the recommendations about the responsibility of informing the participants of all the characteristics of the study to be carried out (Fiallos, 2021).

To collect the information, a pretest and a posttest were applied, called Motivation and Learning Strategies Questionnaire - MSQ SF, which evaluates the criteria established from 1 to 5, with a Likert-type scale as follows: Always (5) - Often (4) - Sometimes (3) - Rarely (2) - Never (1). This instrument has been used in different previous investigations and has been validated by experts in more than 20 languages, whose values have been statistically reliable and the internal consistency measured by Cronbach's Alpha, with a sample of 129 subjects, 36 items; which yielded a Variance of Items (ST2) of 28.96 and a sum of Variance of the items (Si2) of 379.6 that yielded a result of 0.93 considered as a high value represented in Table 1.



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Total Items	Total Subjects	$S_T^2$	$S_i^2$	$\alpha$
36	129	28.96	379.6	0.93

Table 1. Cronbach's alpha calculation values

A correlation analysis was made between the questions of the instrument in a modified version of the original, used by Masso et al. 2012, composed of 36 items referring to motivation and learning strategies. For such analysis the Pearson correlation test was selected, which examines the relationship between two variables. It is used to determine whether there is a linear relationship between Motivation and Performance. In addition, it is the most appropriate in terms of the number of the sample (129) which is high, and better estimation accuracy is obtained. The questions are distributed as shown in Table 2:

Main factor	Specific factor	Dimension	Ítem
Learning strategies	Cognitive and metacognitive strategies	Elaboration	4, 16, 22, 24 y 30
		Organization	13, 14, 17, 18, 38, 40 y 41
		Metacognitive and behavioral self-regulation	1, 2, 5, 6, 7, 15 y 32
	Value component	Intrinsic goal orientation	10, 25, 34 y 35
Motivation	Resource management strategies	Time and resource management	8 y 33
	Cash component	Effort self-regulation	9, 11, 19, 27, 28 y 37
	Value component	Anxiety Assessment of the task	3, 12, 21 y 29 26, 39

Table 2. Distribution of the questions of the Motivation and Learning Strategies Questionnaire - MSQ SF by factors and dimensions and learning strategies. Source: Adapted from the Motivation and Learning Strategies Questionnaire - MSQ SF (Masso et al., 2021.)

This instrument applied as a pretest was used as a diagnostic to corroborate the conditions in which the groups of students were based to determine the level of development of intrinsic motivation, with which information was obtained that supported the decision to design and implement a proposal supported by gamification to foster intrinsic motivation in the improvement of the academic performance of the students who integrated the sample in study. They were divided into two groups: one control with 65 participants and another experimental with 64. The ratings obtained by students completing the first part of the class period were also analyzed, which provided evidence of the academic performance of the students at the time the research was carried out.

After the implementation of the proposal designed, and applied to the experimental group, the instrument referred to as posttest was applied again to verify the change in behavior of the students, which will show the development of intrinsic motivation, after being addressed by the intervention. The ratings were also reviewed, corroborating the



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improvement in academic performance of students in the experimental group addressed by the proposal. Access was made to the overall average of the first and second part of each of the students, which allowed comparisons to be made to have an objective metric of academic performance.

Finally, a comparison test was conducted that showed significant differences between the control and experimental group of students before and after the designed intervention. Thus, additionally, starting from the inquiry, collection and analysis of data, it was possible to establish, understand and analyse the significance of the association, the intrinsic motivation developed through gamification, and its impact on academic performance through the correlation test.

#### 4. Results

This section presents the results of the survey applied to students of the second semester of the Foreign Language Pedagogy Career at the National University of Chimborazo in Ecuador. A sequence of steps was used to obtain the results, and statistical tables and graphs were used to organize the information. A correlation analysis was also carried out to verify the relationship between the intrinsic motivation variables developed through gamification and their incidence with academic performance.

H0= The intrinsic motivation developed through gamification does not affect the academic performance of students in the second semester of the Career Pedagogy of the National University of Chimborazo, they are not independent.

H1= The intrinsic motivation developed through gamification affects the academic performance of students in the second semester of the Career of Pedagogy at the National University of Chimborazo, they are independent.

According to the description of the sociodemographic characteristics of the sample analysed, it was obtained that 129 students aged 18 to 28 participated ( $M=20.64$ ;  $DT=3.32$ ). The majority were between 18 and 22 years of age represented in Table 3:

Age Range	%
18 and 22 years	52.3%
23 and 28 years	47.7 %

Table 3. Distribution of the age range variable of the selected sample.

From the selected age range, the following variables are distributed as shown in Table 4:

Age Range 18 and 22 years old						
Female Sex	Middle Class	Singles	Does not work	Language and Literature	Language	Mention studying Psychopedagogy



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52.3%	69.70%	91.9 %	72.4%	44.3%	33.3%	22.4%
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Table 4. Distribution of multivariate variables within the selected age range.

For the intrinsic motivation variable, the results shown in Figure 1 indicate that the participants in the study showed high indicators, according to the learning strategies analyzed.



Figure 1. Dimensions of the Motivation and Learning Strategies Questionnaire - MSQ SF.

The calculation of the mean of the study of the univariates shown in Figure 1 was performed. When the percentage of the mean was calculated, 50% of the students involved in the study showed high indicators in the use of the different learning strategies: elaboration (86.8%), organization (76.0%), metacognitive and behavioral self-regulation (85.3%), intrinsic goal orientation (89.1%) and self-regulation of effort (89.9%), which corroborates the development of intrinsic motivation. However, with respect to academic motivation, there is evidence of a low valuation of the task (50.4%) and 67.4% present high test anxiety with an average of 33%.

Therefore, it can be deduced that intrinsic motivation is developed in 50% of the students with a high percentage in the indicators described above for 33% with low academic motivation.



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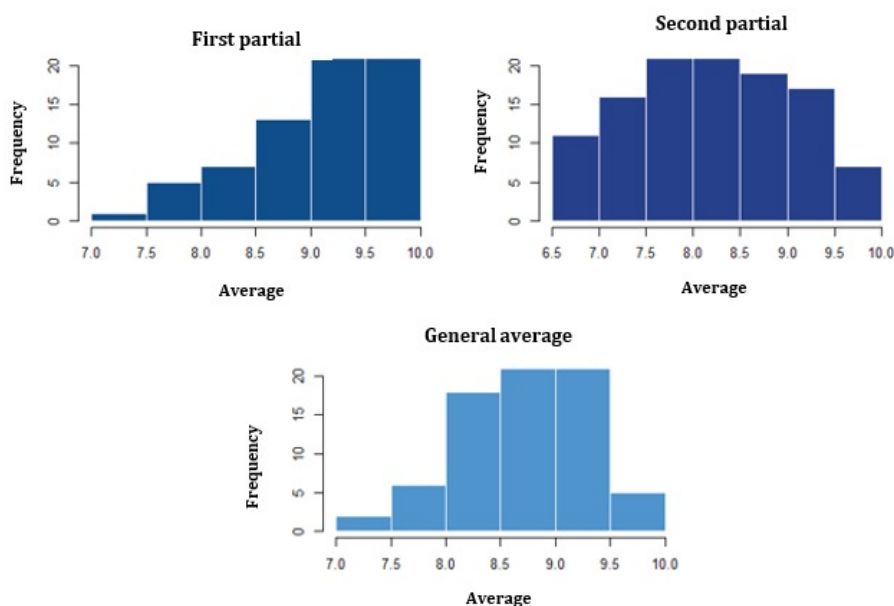


Figure 2. Average Academic Performance

Figure 2 shows the distribution of the average academic performance in each midterm after the intervention with gamification strategies in the sample under study. In this case, it is observed that in the first midterm the average is between 7.5 and 8.5 points; while in the second midterm these grades are between 8.5 and 10.0 points. On the other hand, it is observed that the general average was between 8.0 and 9.5 points..

Statistics	First partial	Second partial	Overall average
n	129	129	129
Minimum	7.29	6.52	7.16
Maximum	10.00	9.92	9.71
Mean	9.47	8.15	8.81
Median	9.79	8.09	8.84
Standard deviation	0.64	0.81	0.46
Coefficient of variation	6.8%	9.9%	5.2%

Table 5. Descriptive statistics of the average Academic Performance.

Table 5 shows that the academic performance in the first midterm ranged from 7.29 to 10.00 points with a mean of  $9.47 \pm 0.64$ ; in the second midterm from 7.41 to 9.66 points with a mean of  $8.15 \pm 0.81$ ; and the overall average from 7.16 to 9.71 points with a mean of  $8.81 \pm 0.46$ . The mean was higher in the first midterm and the coefficient of variation of 6.8% indicates that these grades are both more homogeneous and more homogeneous.



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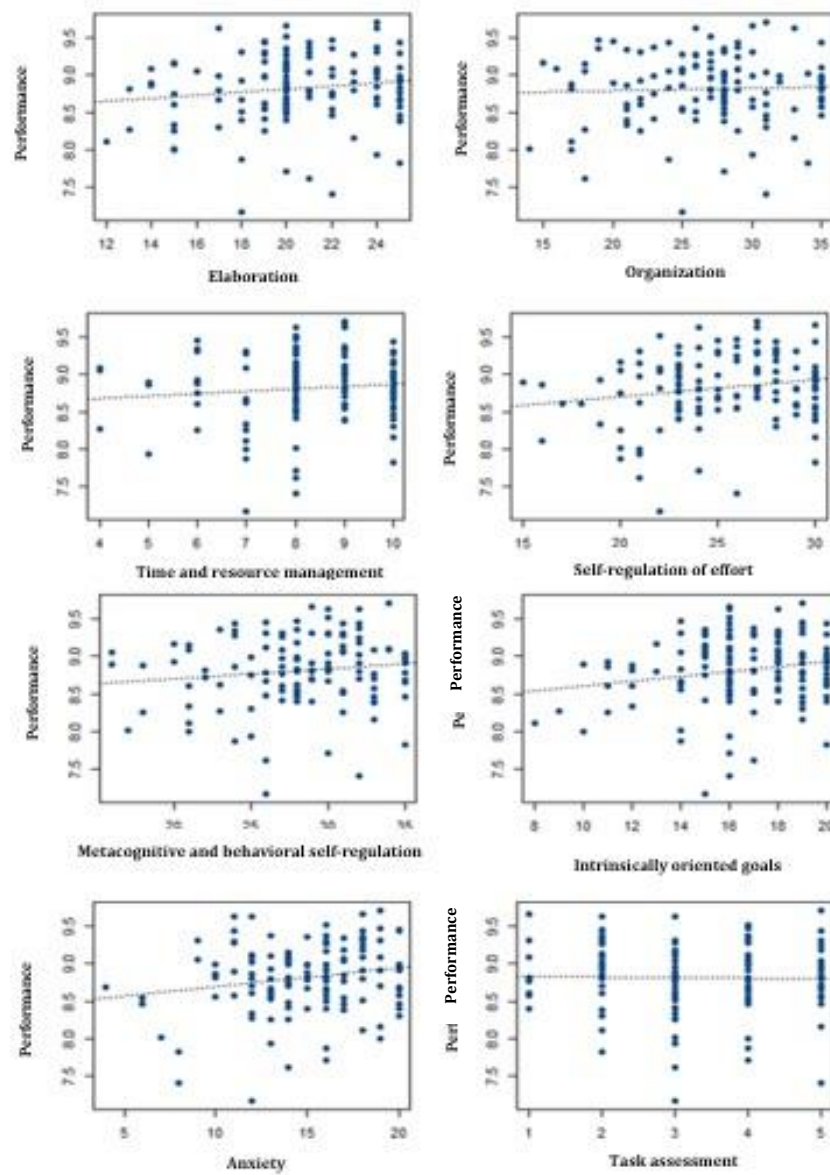


Figure 3. Correlation between Intrinsic Motivation and Academic Performance



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Dimension	Correlation	p-value
Elaboration	0.1444	0.0925*
Organization	0.0307	0.6932
Metacognitive and behavioral self-regulation	0.1263	0.1538
Intrinsic goal orientation	0.1827	0.0382**
Time and resource management	0.0946	0.2861
Effort self-regulation	0.1715	0.0519*
Anxiety	0.1821	0.0388**
Task appraisal	-0.0138	0.8762
Total	0.1565	0.0765*

\* The correlation test is significant at the 0.1 level.

\*\* The correlation test is significant at the 0.05 level.

Table 6: Correlation tests. Source: Own elaboration based on the results of the correlation tests.

Figure 3 and Table 6 show a positive linear correlation between intrinsic motivation developed through gamification strategies and academic performance with learning strategies, as well as for anxiety; while in the case of task appraisal a negative or null tendency is observed. Table 3 shows that for learning strategies the correlation is significant: elaboration with a value of 0.14; intrinsic orientation goals with a correlation of 0.18. In the case of motivation, it can be seen that performance correlates significantly with anxiety (0.18). When a sample of 129 subjects was taken, the graph shows a dispersion of points due to the fact that many values are shown, but the result reflects a linear dispersion, since, if the value of the motivation variable is high, the value of the performance variable increases and they present a positive correlation, so they are highly associated.

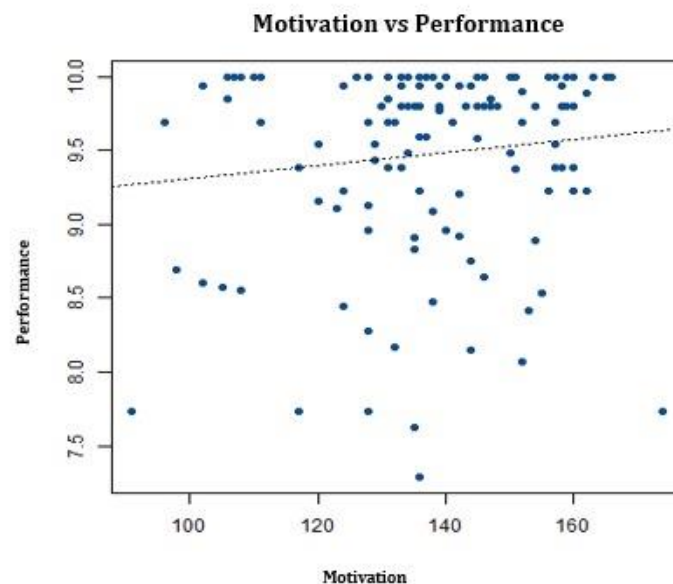


Figure 4. Correlation between Intrinsic Motivation and Academic Performance



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Based on the results in Figure 4, it is evident that there is a positive association between Intrinsic Motivation and Academic Performance that can be expressed by means of the equation:

$$y = 0.30x + 8.41$$

Equation 1

Where e corresponds to academic performance and x the value assigned to the intrinsic motivation of each student. In this sense, it can be said that each student starts from a fixed score of 8.41 points of academic performance, and for each unit that increases the motivation will increase about 0.30 points the student's performance.

H0= The intrinsic motivation developed through gamification does not affect the academic performance of students in the second semester of the Career Pedagogy of the National University of Chimborazo are not independent.

H1= The intrinsic motivation developed through gamification affects the academic performance of students in the second semester of the Career of Pedagogy at the National University of Chimborazo are independent.

The throwing results of such Pearson correlation are +1 is rejected H0, which determines that the intrinsic motivation developed through gamification impacts on the academic performance of students in the second semester of the Career of Pedagogy at the National University of Chimborazo are independent. It is concluded that, as the student's motivation through gamification increases, the higher will be his performance.

For the validity of the questionnaire the Exploratory Factorial Analysis with the methods of univariants and multivariants was used. This method is the most used and suitable for the analysis of surveys and the relationship between the variables used, obtaining as a result a positive value, there is no difference with the correlation results of the variable used.

## 5. Discussion

Where e corresponds to academic performance and x the value assigned to the intrinsic motivation of each student. In this sense, it can be said that each student starts from a fixed score of 8.41 points of academic performance, and for each unit that increases the motivation will increase about 0.30 points the student's performance.

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These results also coincide with previous researches in Aranda and Caldera 2018 and Smiderle et al. 2019 where cognitive and metacognitive strategies (elaboration dimensions, organization, meta-cognitive and behavioural self-regulation), for the value component (intrinsic orientation goals dimensions) and resource management strategies (time and resources management dimensions and self-revision of effort), confirmed a high intrinsic motivation that has a significant impact on the academic performance of university students. These findings support the importance of developing these skills to improve student academic performance. This indicates that teaching strategies, such as gamification, should continue to be implemented to develop the intrinsic motivation of students to contribute to improved academic performance.

However, the research results differed from the findings of the Manzano et al. 2022 study that good academic performance of students in the professional careers in which the research was developed regardless of the level of intrinsic motivation, showing that 41% of students average academic achievement and 16% good performance despite having low motivation. However, this information supports the assertion that, if intrinsic motivation is raised, academic performance could be increased.

## 6. Conclusions

The results of the study indicate that the study participants showed high indicators in the use of learning strategies of elaboration, organization, metacognitive and behavioral self-regulation, intrinsic orientation goals, and self-revision of effort. With regard to the academic motivation, there was a low evaluation of the task and high anxiety for the exams. These results show a close relationship between intrinsic motivation and the learning strategies implemented for achieving academic achievement, verifying the efficiency and effectiveness of the proposal implemented, so it is considered important to develop gamification strategies and activities that promote the creativity, commitment and connection of students in the attainment of educational goals and purposes.

The results of the study also revealed that strategies of elaboration, organization, metacognition and critical thinking, as well as effort and study habits are positively related to each other. Also, a strong relationship between learning and resource management was found in the student sample analysed, which in turn highlights the importance of time management and organization strategies as essential elements in the training process of university students. With regard to the effects of motivation, learning and resource management, it has been demonstrated that college students self-regulate by developing internal motivation which allows them to set goals, control and monitor their learning, and manage their own motivation.

The relationship between intrinsic motivation and academic performance was strengthened through the intervention, as according to the ratings they obtained in the first part was between 7.5 and 8.5 points; while in the second part these ratings are concentrated between 8.5 and 10.0, evidencing the effectiveness and effectivity of the interventions under which students, after having received training to develop intrinsical motivation through



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gamification activities. It is also noted that the scores increased; it is considered that although the students' scores were not low in the first part, they improved significantly for the second part, demonstrating a significant increase in academic performance.

Additionally, according to the results obtained from the development of the research, a positive linear correlation was observed between intrinsic motivation strengthened by gamification strategies and academic performance with learning strategies, as well as for anxiety; whereas, in the case of task evaluation, a negative or zero trend was noted. It was demonstrated that for learning strategies the correlation result significant, for the elaboration, goals of intrinsic orientation and for the case of inherent motivation, it can be seen that there is a positive association with academic performance. This indicates that both the academic performance and the intrinsic motivation of the university students subject to analysis, improved by implementing the intervention with strategies and activities of gamification, which allows it to be recommended in future in its application in university contexts in which a similar problem situation as the present is observed, which was sought to solve with the actions taken for this purpose.

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