# Creativity Development with Cerebral Gymnastics from the Perspective of the Pro.Seso Creativo 3.0 Method

Romero Parra Rosario Mireya[1], Llontop Castillo María del Carmen[2], Mas Vives Oscar Eduardo[3]

[1] *University of Sciences and Arts of Latin America, Lima, Peru*
*E-mail: rmromerop@crear.ucal.edu.pe*
ORCID: https://orcid.org/0000-0002-1319-1171
(Author for correspondence)

[2] *University of Sciences and Arts of Latin America, Lima, Peru*
*E-mail: mllontop@ucal.edu.pe*
ORCID: https://orcid.org/0000-0003-4110-3025

[3] *University of Sciences and Arts of Latin America, Lima, Peru*
*E-mail: omas@ucal.edu.pe*
ORCID: https://orcid.org/0000-0001-6415-7398

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**Abstract**
The aim of this research was to demonstrate the effects of cerebral gymnastics as a strategy in the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the university students. The research is experimental with quasi-experimental design. The sample is represented by 120 students. The research results showed that cerebral gymnastics as the strategy has a positive influence on the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students of the Communication Career of the UCAL-Universidad de Ciencias y Artes de América Latina in the academic period II-2020. The research hypothesis was confirmed, and the null hypothesis was rejected, since when applying the t-Student test in the Study Group, the P-value was 0.000, which is less than the established significance level ($\alpha = 0.05$). Indeed, brain gymnastics becomes a very relevant aspect since it allows developing and enhancing the creative process of people, and it is through creativity that ideas or conceptions can be created, to produce alternative solutions to the difficulties that arise.
**Keywords**: creativity, strategies, education, cerebral gymnastics, method.

# Развитие креативности с помощью гимнастики мозга с точки зрения метода Pro.Seso Creativo 3.0

Ромеро Парра Росарио Мирейя[1], Ллонтоп Кастильо Мария дель Кармен[2], Мас Вивес Оскар Эдуардо[3]

[1] *Университет наук и искусств Латинской Америки, Лима, Перу*
*E-mail: rmromerop@crear.ucal.edu.pe*
ORCID: https://orcid.org/0000-0002-1319-1171
(Автор для корреспонденции)

[2] *Университет наук и искусств Латинской Америки, Лима, Перу*
*E-mail: mllontop@ucal.edu.pe*
ORCID: https://orcid.org/0000-0003-4110-3025

[3] *Университет наук и искусств Латинской Америки, Лима, Перу*
*E-mail: omas@ucal.edu.pe*
ORCID: https://orcid.org/0000-0001-6415-7398

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**Аннотация**
Цель исследования – продемонстрировать эффекты гимнастики мозга как стратегии развития креативности у студентов с помощью метода Pro.Seso Creativo 3.0. Дизайн настоящего исследования квазиэкспериментальный. Объем выборки составил 120 человек. Результаты исследования показали, что гимнастика мозга положительно влияет на развитие креативности у студентов Университета наук и искусств Латинской Америки (UCAL) в учебном периоде II-2020. Гипотеза исследования была подтверждена, а нулевая гипотеза отвергнута, поскольку при расчете t-критерия Стьюдента значение P было равно 0,000, что меньше установленного уровня значимости (α = 0,05). Гимнастика мозга становится очень актуальным аспектом, поскольку она позволяет развивать и усиливать творческий процесс людей, а именно через творчество можно создавать идеи или концепции, вырабатывать альтернативные решения возникающих трудностей.
**Ключевые слова**: творчество, стратегия, образование, гимнастика мозга, метод.

## Introduction

In andragogical practice, some teachers do not stimulate the creative potential of their students, therefore is a need to look at this aspect in more detail (García, 2020). In that sense, cerebral gymnastics offers routines and exercises to increase the effectiveness in higher education. The central focus of cerebral gymnastics urges the combination of valuation, and physical and intellectual creation since the school period, therefore, experts agree that teaching must be based on the development of creativity. This requires didactic work aimed at educating students to be creators of images and products this shows that during academic training it will be necessary at times to raise creativity levels and to incite it, this requires teachers who are committed to these aspects (Camilloni, 2019; Del Val & Ortega, 2017; Savant, 2004).

The present research emphasizes the importance of embedding the creative appreciation of students in the socio-cultural environment through the senses (visual, auditory, tactile, gustatory, olfactory) to unify the particular, the environment, the collective and the time with the aim of judiciously perceiving the motives that demonstrate the extraordinary emotion of enjoyment in the face of any stimuli.

Consequently, Gardner (2020) argues that the current concept of cerebral gymnastics calls for the union of the valuing of body and mind practice, requiring pedagogical action aimed at instructing, as well as preparing student image-makers. That is why experts suggest teaching through sight and production, through studies that will enhance and stimulate students' creativity.

The research is justified by its theoretical and practical contributions, as the derivation of cerebral gymnastics is studied as a skill to deploy creativity in students, which generates new theories about variables and leads to practical implications for the benefit of university students. Cerebral gymnastics help unblock imagination, exercise brain under three inferences: learning is an action, automatic and recreational, that extends over the course of existence; learning isolates are inabilities to emerge from circumstances of stress and uncertainty; human beings block themselves by not enhancing the brain capacity.

Moreover, among the benefits of cerebral gymnastics are the balancing of emotional, physical, and mental states demonstrated in the perfection of learning which contributes to the proper expression of ideas, trains attention and memory, increases creativity. It relieves stress, promotes good health, balances body and mind, gives rise to integral learning, strengthens self-esteem and self-reliance, extends the programming and classification capabilities (Ibarra, 2000; Romero et al., 2014).

Also, creativity begins with the knowledge of wanting to express oneself through unconventional means, solve a problem, or invent a product. It is important to note that considering its relevance, the Universidad de Ciencias y Artes de América Latina (UCAL, 2020) has created a methodology called Pro.Seso Creativo 3.0, which is a method consisting of a series of stages to help meet challenges or to solve problems to discover creative solutions, allowing the student to progress in practice, backwards and forwards again on an experimental basis; use error as a learning experience, and go through moments of ambiguity at the beginning to reach concrete and tangible solutions in the end with the help of creativity.

Consequently, to prove the effects of cerebral gymnastics as a creativity-enhancing skill in students, its continued application in the procedure of instruction at the university level can be considered, since the proposed strategy sets out the techniques, methods, and resources to be implemented to boost students' creativity. Furthermore, this method, developed at the university, can raise the creative potential of students to have a positive and far-reaching impact on society by solving problems or difficulties that arise, and contributing to the scientific and technological progress of the nation and Latin America. In this regard, ways continue to be sought to enhance the creative potential of students in order to prepare them for the challenges and difficulties ahead.

**Research aims**

A research aim was to demonstrate the effects of cerebral gymnastics as a strategy in creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students of Creativity I course of the UCAL Communication Career in the academic period II-2020.

**Theoretical reflections**

According to Gardner (2020), cerebral gymnastics allows to reach the communication between the body-brain, which is manifested in the removal of stress and tension from the person, channeling positive energies through movements and discarding negative ones. Consequently, the improvement of learning and thoughts occurs with the movement, hence, the importance of constantly practicing exercises to facilitate the building of neural tissues, because when neurons are activated by learning, myelin is produced, a

substance that increases the speed at which nerve impulses are transmitted; insulates, protects, and assists the renewal of nerves when they are damaged. Therefore, the more myelin production, the faster the message is delivered, the more neurons and impulses are highly potentiated. (De la Iglesia, 2018; Ruiz et al., 2017).

Indeed, the lack of creativity of learners may be due to the fact that both at home and at school, the right brain hemisphere, the side of the brain where creative activities take place, is not being developed, generating the training of human beings with little determination, without achieving their goals (Bernabeu & Goldstein, 2016). The importance of using both brain hemispheres to take advantage of all their utilities, developing competences, skills, decreasing negative habits, strengthening the immune system, increasing creativity, controlling emotions, attracting positive thoughts should be noted (García et al., 2016; Jartín & Chao-Fernández, 2018; Tirado-Plasencia et al., 2016). Currently, cerebral gymnastics is applied as an effective technique in European countries to train athletes as in the instruction of dialects and other academic doctrines.

In other words, the peculiarity of creativity, according to Valiente (2017), is necessary for an educational system, as teachers play a preponderant role in the future of society, forming creative, critical, reflective people, fostering noticeable changes in students' creative faculties.

In this way, the enigmas of creativity become formidable by giving it a concept, which runs from knowledge to communication, to make out by teachers who seek to expand the creativity of students to show them that their creativity needs to be liberated, harnessed, with sustenance that indicates how it is not based exclusively on the arts, nor are there any limitations to it.

Moreover, Guilera (2020) details cerebral gymnastics as a learning procedure based on the use of kinesiological techniques to activate the brain, simultaneously with the advancement pattern of the intelligences, which aim to expand visual, auditory and kinesthetic sensory capacities, testing relaxation and breathing methods that release positive energies, accelerate neurons, optimize cognitive and emotional performance, to train brain flexibility and strengthen memory, and live with knowledge and vigor.

Cordero y Rivera (2020) specifies that mental or cerebral gymnastics is a guide that includes skills, training, instruments to develop and increase creativity in a safe and recreational way. However, he states that this beneficial procedure is performed with will and care, since the brain is not exhausted, it continues to function when asleep. Also, it is stated that cerebral gymnastics is based on the innovation of mental processes, learning, the improvement of thinking, with the help of memory, and life with full knowledge and vigor, by advancing a strategy based on the provisions of Western medicine.

On the basis of the above ideas, persistent exercise training favors the construction of neural networks. According to Guilera (2020), when neurons are mobilized by the learning effect, the speed of nerve impulse transfer is increased, protecting and assisting nerve reproduction as well as the quick transmission of the message. It is important to mention that generally, trained neurons have nerve impulses that travel one hundred meters per second (García et al., 2016). For this reason, these techniques must include both cerebral hemispheres, in addition to sight and body, to favor the expansion of learning and creativity of people.

It should be noted that cerebral gymnastics is not used to treat emotional problems such as anxiety or depression, although people who practice it report improvements in their mood. Moreover, the exercises are simple, some are for the nervous system and others for hearing (Sáenz & Guapisaca, 2015). Also, constant practice improves the learning of human beings in any period of their lives. It facilitates expression of ideas, harnesses memory, perfects creativity and attitude towards daily challenges.

For research purposes, the conceptualization of creativity proposed by Mas and Vidal (2019) will be taken as a reference as "the process of the development of original ideas, through the discovery of needs, validated within a determined field. Therefore, creativity is not inherent to an individual" (p. 5). It is reproduced in the middle of the vision of the creative subject, the research field and the judges of a field of knowledge.

**Pro.Seso Creativo 3.0**

The Pro.Ceso Creativo 3.0 method, "is a set of stages that help you face challenges or solve problems to find solutions" (Mas & Vidal, 2019, p. 6). Although these stages are presented linearly, in practice, the method allows creative people to move forward, retreat and progress in an empirical way, taking advantage of mistakes as lessons learned and go beyond moments of ambiguity when starting to propose or create solutions that are noticeable at the end of the creative work. Figure 1 shows the five (5) stages of the Creative Process 3.0.

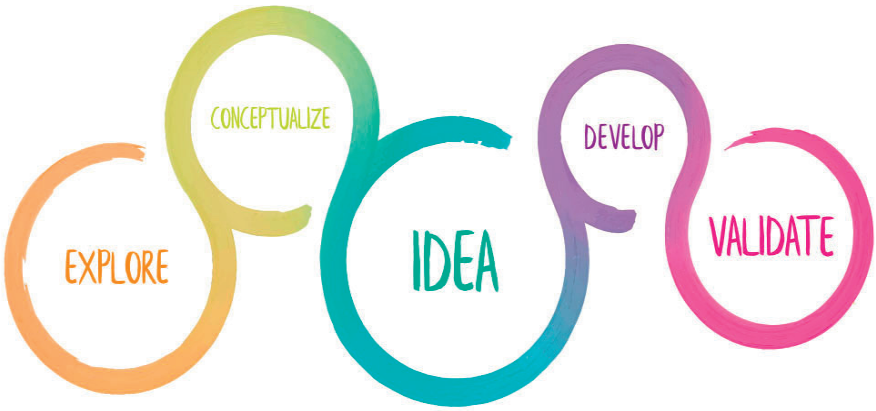



*Figure 1. Stages of Pro.Seso Creativo 3.0*
Source: Pro.Seso Creativo 3.0 Method Manual, UCAL (2019).

**Stages of Pro.Seso Creativo 3.0**

The Pro.Seso Creativo 3.0 method is developed in five stages: explore, conceptualize, idea, develop and validate (Mas & Vidal, 2019), regardless of the order in which they evolve, since it can be a cyclical process until the purpose set out at the beginning of the activities is achieved. These stages are described below.

– *Explore:* In this stage, the situation is analyzed through a preliminary investigation and in-depth exploration of the user and its context, in order to define or state the problem in depth, regularly. In this way, one will have solid arguments to create a solution later to go through this stage in a profitable way. One has to pay close attention to all interventions in the field using all senses, to understand how, when, where, why and other questions.

– *Conceptualize:* In this stage, the concept that directs and focuses on the creation of solutions is defined. Therefore, it is important to maintain the connection with the problem found in the previous stage. Although it is a stage of the concept production that is usually abstract, it is better when it is written in a greater detail as there is usually confusion between the concept and the idea. For example, happiness is a concept that can be visualized, communicated, and expressed through different ideas such as a happy face, a hugging mom, jumping with arms up, etc.

– *Idea:* In this stage, the specific solution to the problem is generated. It is important to note that several solutions may arise that require further research on a specific technical topic. In addition, one can always return to the Explore stage to investigate further, at the same time, one must define a solution, otherwise one will not be able to complete the project.

– *Develop:* This stage is usually the most energetic, since the idea is finally built and materialized in an object, which is called a prototype. A prototype is the early and tangible solution that will be tested.

– *Validate*: In this stage, a created prototype is submitted to the user to determine the value, check if it works well, see if the user understands it. The user also examines the errors and improvements they may have, with objectivity and impartiality.

**Methodology**

The research had an explanatory approach since one or more independent variables (presumed causes) were deliberately manipulated to examine the effects of this administration on one or more dependent variables (effects) within a control context for the researcher (Hernández et al., 2018). In this research, the variable treated is cerebral gymnastics to study the effects on creativity.

The research is experimental with a quasi-experimental design. The sample is represented by 120 students of Creativity I course of the Communication Career at UCAL in the academic period II-2020, formed by two groups: "study group", corresponding to section 1733 and "control group", represented by section 1734, to which a pretest was applied.

Then, the students in the study group received the experimental treatment based on cerebral gymnastics, and finally, a post-test was administered to both groups to compare the creativity levels obtained.

Cerebral gymnastics as a strategy for creativity development from the perspective of the Pro.Seso Creativo 3.0 method in students, mentioned above, was developed with the "study group", and is intended to offer through methods, techniques, resources and activities, the strengthening of skills and attitudes, to obtain optimal levels in the creativity development. In addition, it provides options for solutions to the difficulties that are arising, in reference to the management of skills and competencies for academic effectiveness. This was developed virtually, distributed in workshops, with a duration of fifteen (15) sessions of three (3) hours for a total of twenty-eight (28) hours. It is important to note that the strategies referred to are incorporated in the development of the activities of the syllabus of the Creativity I course of the Communication Career of the university referred to above, following the instructional model depicted in Figure 2.

Figure 2 summarizes the instructional model with cerebral gymnastics strategies to achieve the development of the stages of the Pro.Seso Creativo 3.0 method in university students, which considers cerebral gymnastics to be an essential element to optimize the process that guarantees effective creativity development. Therefore, the plan with objectives and strategies of cerebral gymnastics was developed. The plan contains exercises and activities aimed at the educational improvement of creativity of students capable of facing any difficulty that may arise. The development of the stages of the Pro. Seso Creativo 3.0 method was considered in the two groups, the "study group" and the "control group", to verify the influence of the referred strategies, comparing the results of the posttest in both groups after having developed this model together with the strategies of cerebral gymnastics in the "study group".

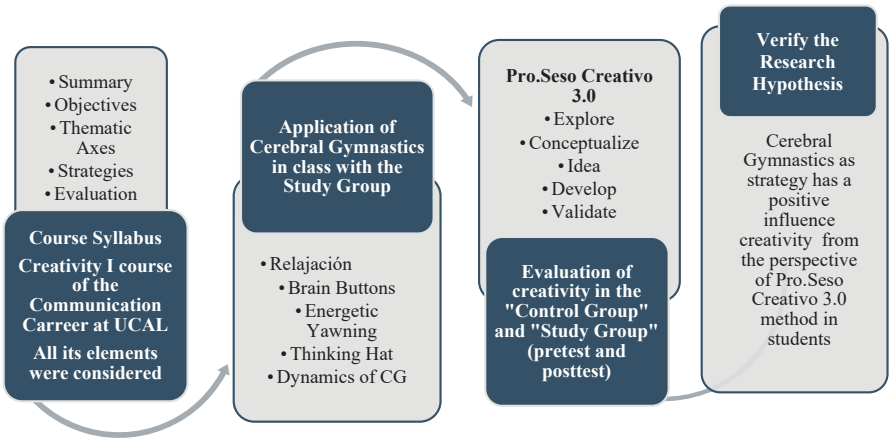



*Figure 2. Instructional model based on Cerebral Gymnastics.*
Source: Own elaboration.

In relation to the implications, in all research, reference is made to the process of the search for information and the instruments used for this purpose. Thus, there are different procedures and instruments for such a search; therefore, for the present research, observation was used as a technique, and a test on creativity in Google Forms was designed as an instrument, which served as a measurement tool. The test was composed of 30 items, each with 5 response options, using a Likert-type scale (always, almost always, occasionally, almost never, and never). It should be noted that the test was a digital evaluative tool to recognize the level of compliance in which a particularity or a visible activity is externalized. Also, the evaluation indicates the degree to which student creativity is valued in reciprocity to a given trait. It is important to note that it was validated by five experts and its reliability was determined with a 0.89 Cronbach's Alpha coefficient. The experiment was carried out in two moments for both groups, before applying the treatment with cerebral gymnastics as a strategy and after the intervention.

It should be noted that cerebral gymnastics as a strategy was developed with the Pro.Seso Creativo 3.0 method with the following objectives. First, to encourage the improvement of student creativity, so that with the use of this strategy they acquire it. For that, students' feedback was collected. Second, to promote autonomous and enriching learning where the learner takes advantage, investigates and learns to express and create through what has been assimilated. The third objective is that the students learn in a pleasant, creative way in a pleasant environment.

The data processing of the tests was carried out through the Statistical Package for the Social Sciences (SPSS), the study was carried out descriptively using this program, yielding the arithmetic means of the scores obtained in the tests, as well as, the Student's t-test, to establish significant differences, the mean of the grades before and after the application of the treatment, with a significance level $\alpha = 0.05$.

**Results**

For the data analysis, the scale established in Table 1 was used to verify the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students from both groups (control group and study group). The scale contains the categories of outstanding, efficient, and deficient, with ranges that oscillate from 0 to 4 in arithmetic means, obtained from the pretest and posttest application.

*Table 1. The scale used for the data analysis according to the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in students.*

| *Categories* | *Ranges* |
|---|---|
| Deficient | 0 – 1,33 |
| Efficient | 1,34 – 2,66 |
| Outstanding | 2,67 - 4 |

*Source: Own elaboration.*

Table 2 shows the arithmetic means obtained in the creativity dimensions from the perspective of the Pro.Seso Creativo 3.0 method by the students in the control group, as well as the differences in the pretest and posttest, which do not exceed 0.10 points. Specifically, in the pretest, most of the stages of the creative process such as Conceptualize, Idea, and Develop are within the category of efficient, according to the established scale. Also, the first dimension Explore reaches the category of outstanding, and the difference in the means between pretest and posttest is minimal, corresponding to 0.02 points, while in the Validate dimension is deficient, both in pretest and posttest. Furthermore, in the Conceptualize dimension, no difference was recorded in the arithmetic means of the pretest and posttest.

In general, it can be concluded that no significant differences are reported between the means of the creativity dimensions from the perspective of the Pro.Seso Creativo 3.0 method by the students of the control group, in the two moments in the investigation.

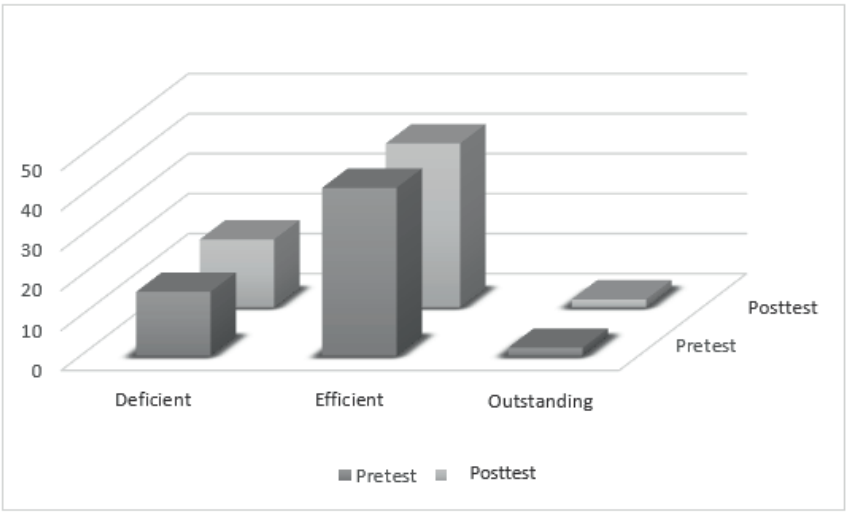
*Table 2. Arithmetic means of creativity dimensions from the perspective of the Pro.Seso Creativo 3.0 method in the students of the control group.*

| *Dimensions* | *Arithmetic means (Pretest)* | *Arithmetic means (Posttest)* | *Mean Differences* |
|---|---|---|---|
| Explore | 2,96 | 2,98 | 0,02 |
| Conceptualize | 2,57 | 2,57 | 0 |
| Idea | 2,23 | 2,24 | 0.01 |
| Develop | 2,15 | 2,12 | 0,03 |
| Validate | 1,22 | 1,32 | 0,10 |

*Source: Own elaboration.*

Graph 1 shows the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students of the control group. According to the categories of the established scale, there are no significant differences between the pretest and the posttest since 16 students present deficiencies, and in the posttest, the number increases to 17; while in the efficient category, in the pretest, there are 42 students and then, the number decreases to 41. It is important to highlight that the outstanding category was only reached by two students, both in the pretest and posttest.

In general, it can be stated that the students in the control group efficiently developed the creative process in their academic activities. However, the results of the study by Bustillos (2019) should be considered. It states that actions must seek to change the thought tendency, create new ideas, match phrases and notions, devise stories or inventions, solve rigorous challenges, perform conservation gymnastics, memorization and use counter-logic, and perform physical movements.




*Graph 1. Development of the Pro.Seso Creativo in the students of the control group.*
Source: Own elaboration.

Moreover, Table 3 shows the arithmetic means obtained in the creativity dimensions from the perspective of the Pro.Seso Creativo 3.0 method by the students of the study group and their differences in the pretest and posttest, of which there are large differences between them, the most notorious being in the Validate dimension with 2.26 points, followed by the Idea with 1.51 points.

In addition, in the Validate dimension, which consists of checking if it works well and if the user understands it, deficiencies are reported in the Development when applying the pretest, and later, after the intervention it develops in an outstanding way, as well as in other dimensions in the posttest. This indicates that the intervention with cerebral gymnastics has a positive influence on the development of the stages of the creative process of the students.

*Table 3. Arithmetic means of the creativity dimensions from the perspective of the Pro.Seso Creativo 3.0 method in the students of the study group.*

| *Dimensions* | *Arithmetic means (Pretest)* | *Arithmetic means (Posttest)* | *Mean Differences* |
|---|---|---|---|
| Explore | 2,98 | 4 | 1,02 |
| Conceptualize | 2,57 | 3,96 | 1,39 |
| Idea | 2,23 | 3,74 | 1,51 |
| Develop | 2,15 | 3,65 | 1,50 |
| Validate | 1,22 | 3,48 | 2,26 |

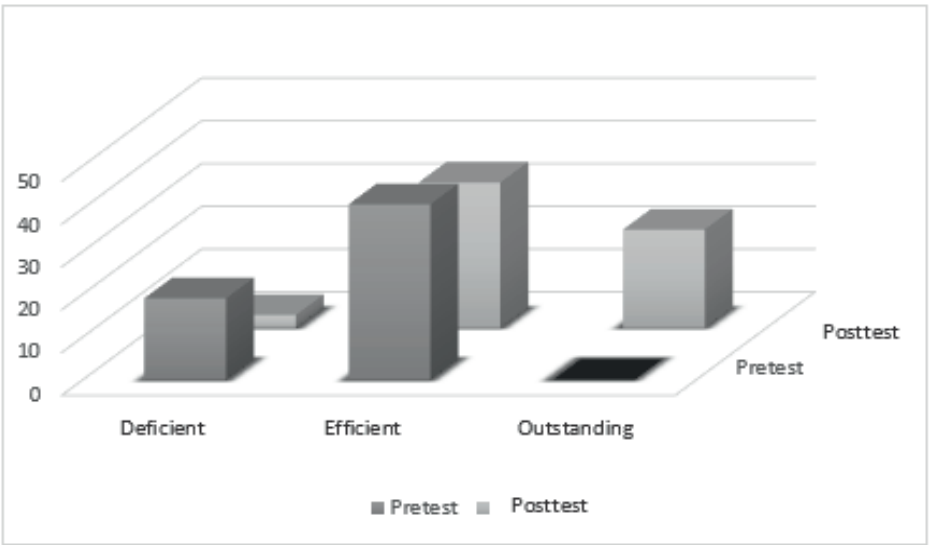
Source: Own elaboration.

Graph 2 shows the creativity development process from the perspective of the Pro. Seso Creativo 3.0 method in the students of the study group. According to the categories of the established scale, in the pretest, most of the students (41 students) have efficiently developed the referred variable. There are significant differences between the amounts

reported in the pretest and posttest. Specifically, in the deficient category, it can be seen that 19 students in the pretest drop to 3 students in the posttest. In the outstanding category, there are no students in the pretest. Then, in the post-test 23 students achieve this category of development.

It is important to emphasize the improvement in creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students after having implemented the intervention with cerebral gymnastics. This is fundamental in the progress of people's creativity.




*Graph 2. Creativity development from the perspective of the Pro. Seso Creativo 3.0 method in the students of the study group.*
Source: Own elaboration

After applying the Student's t-test, in the study group, the p-value was 0.000, which is less than the established significance level ($\alpha = 0.05$); therefore, the research hypothesis (Hi) is accepted: cerebral gymnastics as a strategy positively influences creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students of the Creativity I course of the Communication Career at UCAL in the academic period II-2020. And the null hypothesis of the research (Ho) is rejected: cerebral gymnastics as a strategy does not positively influence the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students of the Creativity I course of the Communication Career of the UCAL in the academic period II-2020.

**Discussion**

The results obtained are similar to the conclusion made by Bonet et al. (2017) in a pilot practice conducted with the cohort of 44 students, which demonstrated that actions with digital reproduction and three-dimensional printing equipment are admitted for the improvement of the creative capacity. Likewise, the results agree with the inferences reported by Del Moral et al. (2018) in the research on strategies of students' emotional and creative development, revealing significant qualitative estimates concerning the changes observed at the initial level of enthusiastic and creative skills by students.

In addition, the results obtained are very equivalent to those of the study by Romero et al. (2014) who reported with a p-value of 0.001, which was lower at the established significance level ($\alpha = 0.03$), that cerebral gymnastics has positive effects on students' creativity, reaffirming their research hypothesis.

On the other side, Garcia et al. (2016) in research on the effect of cerebral gymnastics techniques on initial literacy advancement, obtained similar results to those of the present research since the post-treatment scores were compared with all the scores obtained previously. The influence generated by the executed technique was reflected. Since these were significantly higher than those originated in the other groups that did not present the stimulus with cerebral gymnastics with $p < 0.05$, it is concluded that the technique used has a positive influence on the dependent variable of the study.

In the same line of research, Sáenz and Guapisaca (2015) analyzed cerebral gymnastics as a methodological strategy, based on the studies of Dr. Dennison, in the elaboration of a manual with various trainings that optimize motor skills and creative learning, improving the neurological circumstances between the brain and the body through movement. Indeed, the contributions of the present research also provided the basis for proposing cerebral gymnastics as a strategy for the creativity development of the students through the perspective of the Pro.Seso Creativo 3.0 method, which offers the necessary tools to enhance the creative qualities of the students.

On the other hand, the main limitation of the research is the fact that only students are considered as units of analysis for the experimental intervention. However, the results are generalized by the statistical methods used. It is suggested to continue conducting studies with larger samples in this area of research.

## Conclusions

The results of the study showed that cerebral gymnastics as a strategy positively influenced creativity development from the perspective of the Pro.Seso Creativo 3.0 method in the students of the Creativity I course of the Communication career at UCAL in the academic period II-2020, the research hypothesis was confirmed, and the null hypothesis was rejected. Indeed, brain gymnastics becomes a very relevant aspect, since it allows to develop and enhance the creative process of people (and through creativity, ideas or conceptions can be created), produce alternative solutions to the difficulties that arise in an original or authentic way, developing lateral thinking in students.

In this sense, the positive effects of cerebral gymnastics in the creativity development from the perspective of the Pro.Seso Creativo 3.0 method in students are evidenced. Therefore, we propose the implementation of the strategy used in all academic courses taken by the students in order to enhance their creativity.

## Open Data Statement

The data from the present research are available in the repository of the Creativity Research Center of UCAL.

## Ethical Statement

In the development of the research, the national laws and all aspects, responsibilities and principles of the Code of Ethics of the Creativity Research Center of UCAL were considered with the endorsement of the ethical routines in the work with the students who were participants or units of study. Likewise, we complied with the Code of Ethics of the American Educational Research Association – AERA, for educational research.

## Conflict of Interest

There is no conflict of interest in this research.

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