

FORMATIVE RESEARCH AND PROFESSIONAL COMPETENCES IN LATIN AMERICAN STUDENTS

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Abstract

Currently, teachers in training can acquire professional skills from research practice, therefore, from the perspective of university social responsibility, universities are called to implement scenarios to achieve these ideals. Based on the above, the objective of this study is to apply a training program for professional competencies through formative research in students of the first cycle of education in five faculties of education located in Metropolitan Lima. It was a quantitative, descriptive, quasi-experimental study with a purposive sample of 140 students in the first cycle of education from five university faculties located in Metropolitan Lima. The measurement included a pretest and post-test evaluation, with a 24-week educational intervention. The results show a reduction of 61.57% of students in the initial stage and an increase of 63.50% of students who were located on the achieved scale, taking into consideration 100% of the sample selected for the analysis. Among the conclusions, it stands out that the educational intervention was satisfactory and that it is prudent to continue with studies of this type to achieve improvements in the competency-based training of university students based on formative research.

Keywords: students, higher education, teacher trainees, professional competencies, formative research.

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1. Introduction

Scientific research demands restraint, prudence and humility; it cannot claim to explain the totality of brain functions at once. It tries to explain progressively and approach objective knowledge step by step.

Jean-Pierre Changeux (1998)

The field of scientific research should be assumed as a continuous process of construction and reconstruction that makes it possible to capture the substantial relationships of reality; however, this does not mean that absolute truths are reached; on the contrary, the scopes of research are usually starting points for the understanding of the phenomena. Because of this reality, this study begins its disquisition with the phrase of Changeoux (1998), which allows reflection on the reality of scientific knowledge.

Based on the above, it is important to understand that scientific research is generated from university training (García *et al.*, 2018) and, therefore, universities must be guarantors of promoting training plans that provide scenarios for the acquisition of these skills in professionals in training (Rojas Betancur & Méndez Villamizar, 2017). At this point, University Social Responsibility (USR) becomes more relevant and understood as a new management model based on the ethical commitment to promote and implement socially responsible practices externally and internally (Vallaes, 2018).

In this sense, from the RSU, the formative programs of the different professional careers should include stimulating courses for the acquisition of research skills that allow students to develop scientific studies proper to the transformation and social emancipation from each of the contexts of development, this through the postulates of critical and reflective thinking (Dáher Nader *et al.*, 2018; Bezanilla Albusua *et al.*, 2018).

Therefore, it must be understood, without fail, that the training of professional competencies entails institutions with high-quality standards, whose competencies transcend the field of specialization to ensure better working conditions and better performance in the challenges they face (Turpo-Gebera *et al.*, 2020).

Now, when talking about the case of training of research competencies in teaching professionals, they should be oriented to the achievement of interpretation, argumentation, and proposal of alternative measures among others, which promote a transformation in the pedagogical practice, in addition, in conjunction with generic, specific and professional competencies, they trigger a new way of perceiving and exercising the educational fact itself (Delgado Nery De Vita & Alfonzo Mendoza, 2019) (Figure 1).

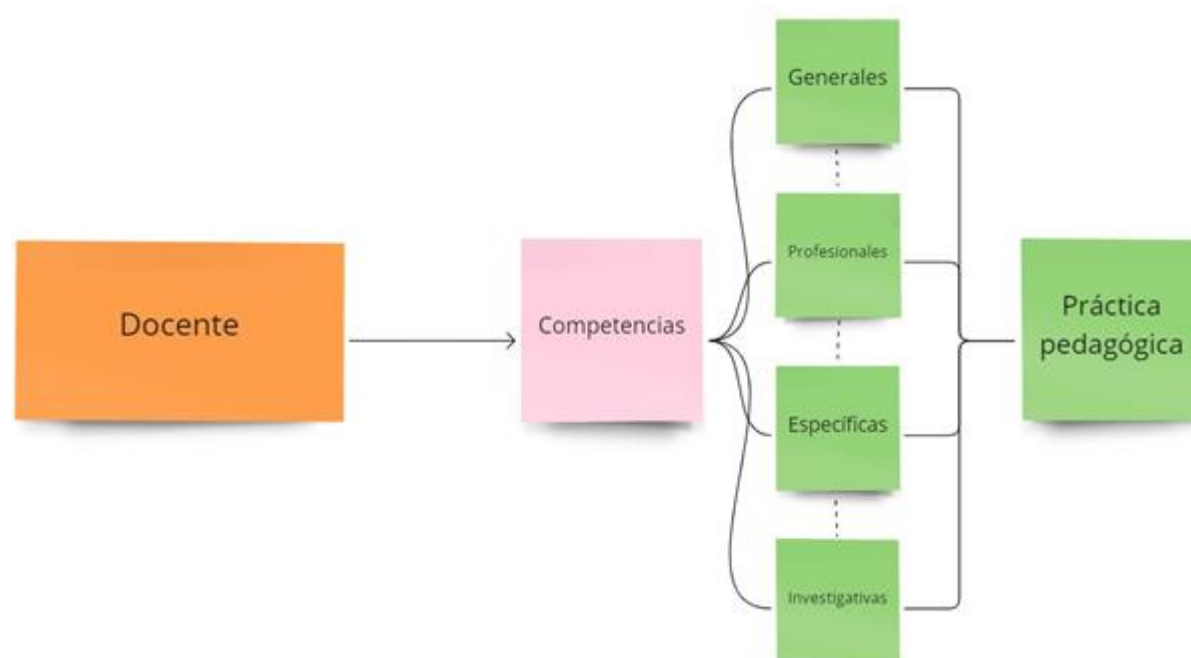


Figure 1. Competencies needed in teaching professionals

Source: own elaboration

According to Figure 1, it is possible to understand that teachers' competencies are, in short, a complex construct interrelated with the scaffolding function to sustain and transform pedagogical practice, focusing especially on the requirements of student populations.

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In this sense, it is important for teachers in training to acquire skills inherent to their professional career from the perspective of formative research, understood as a detailed teaching and learning process that triggers favorable scenarios where students demonstrate the ability to determine and solve problems under specific objectives that seek to provide solutions to the existing reality, generating new ways of perceiving research phenomena, stimulating knowledge towards new fields and diverse perspectives (García- Gutiérrez & Aznar-Díaz, 2019).

However, it should be considered that this reality is specifically circumscribed to the reality of USR in Latin America and the Caribbean, where universities seek democratic, participatory and protagonist dialogue, to solve social problems, therefore, higher education institutions are oriented to the training of professional skills with a high sense of social belonging (Llenera *et al.*, 2020). In this sense, the higher education scenario in Peru does not differ from regional university trends, seeking to respond to the problems most felt by society, to reduce inequalities and social gaps (Cuenca & Urrutia, 2019).

In addition to the above, there is evidence at the national level of problems related to an imbalance in pedagogical practice associated with traditional teaching patterns, which denotes a low development of professional and investigative competencies in teachers. Proof of this is evidenced in the Program for International Student Assessment tests (known as PISA report) developed by the Organization for Economic Cooperation and Development (OECD) in recent years, where Peru ranks in the last regional position, and despite the progress, it continues as one of the countries with the lowest results in reading comprehension and mathematical reasoning (Ministry of Education-MINEDU, 2018).

Likewise, what has been described above allows understanding that it is an urgent task to innovate in educational strategies that involve research for the formation of competencies in education students at the national level, to reverse the current state and continue with improvements within the educational context, transforming society from education, since, as explained by Amat and León *et al.* (2020), this pillar is capable of reversing the current weak conditions, generating the necessary progress for the professional development of the nation. However, it must be assumed that this change can only come about from competency-based training focused on research by teachers in training.

Given the reality of the above, it is clear to understand that professional and research competencies are essential for the training of teachers, who will be able to innovate, according to the reality of the educational context, in strategies during learning sessions, in which the student can be the actor and promoter of their learning through social constructivism and self-regulation (Rosales-Veitia *et al.*, 2021), in addition to promoting studies that leave evidence about the educational realities and alternatives to solve current problems in this field of knowledge.

At this point, it is noteworthy that there is regional concern about competency-based teacher training using formative research. In this sense, it is not surprising that research is being developed to present the positive influence of these pedagogical strategies on better results related to teaching skills. Such is the case of studies developed in countries such as Colombia, in which Rojas Arenas *et al.* (2020), through a process of constant training, managed to improve students' research competencies, evidently leading to an improvement in professional skills.

In the case of Peru, studies such as those developed by García *et al.* (2018), allow approaching the understanding that formative research and the acquisition of communicative and investigative competencies. Additionally, Pauca Gonzales *et al.* (2021), demonstrated a significant relationship between both variables, being relevant to its application even in students in their last semesters.

Taking into consideration the previous exposition, the question arose: What would be the behavior of the students in the first cycle of education at various universities located in Metropolitan Lima if an educational intervention for the formation of competencies through formative research would be applied? This led to the establishment of the objective of the study, which is to apply a training program for professional competencies through formative research in students of the first cycle of education in five faculties of education located in Metropolitan Lima.

## 2. Methodology

The research was covered under a quantitative approach of applied research typology, with a descriptive level, making use of a quasi-experimental design with pre-and post-test (Zurita *et al.*, 2018). Since it was sought to consolidate the students' research skills or competencies in the pre-test

and post-test. Likewise, the research was conducted in the faculties of educational sciences of universities belonging to metropolitan Lima, Peru, located in southern Latin America. The population was constituted by students who attended the first semester (initial) of five faculties of education sciences, under an analysis of socioeconomic data provided by the faculties, 65% are from rural areas. In contrast to the sample, it consisted of 140 students, based on non-probabilistic purposive sampling (Otzen & Manterola, 2017), choosing intact participants, according to the correspondence of the research design approach (Table 1).

*Table 1.*  
*Distribution of participating students*

| Faculty of Education                | Participants |    | Total |
|-------------------------------------|--------------|----|-------|
|                                     | M            | F  |       |
| 1                                   | 14           | 28 | 42    |
| 2                                   | 17           | 19 | 36    |
| 3                                   | 18           | 11 | 29    |
| 4                                   | 7            | 11 | 18    |
| 5                                   | 9            | 6  | 15    |
| <b>Total number of participants</b> |              |    |       |

Source: own elaboration

Consequently, formative research was approached as a characterization variable applied through three strategic teaching-learning bases: information gathering, research seminar and monograph, established in 24 sessions, which were led by professional teachers who were experts in the promotion of research. As a variable of interest, the student's professional competencies were considered as a variable of interest, from which the communicative and investigative skills were derived; the communicative skills were measured in terms of knowing how to speak, listen, read and write, while the investigative skills dimension included observing, describing, analyzing, synthesizing and interpreting.

### 3. Data collection techniques and analysis

Within the established techniques of information, observation and examination were approached, with their instruments such as the rubric as a pertinent guide for the measurement of actions and products used by the students for the achievement of academic objectives; and the written test, which was useful for the measurement of the students' professional competencies (skills) to be demonstrated in the process of educational development of learning. The aforementioned made it possible to collect data related to student competencies (communicative and investigative). For their part, the instruments were validated under the judgment of experts, demonstrating the reliability and validity of the content. The study statistics were based on the difference of means with Z distribution, under a confidence level of 95%.

It is important to mention that the evaluation of the students through the instruments was based on a scale of 1 to 20, which, for the practical purposes of this research, was transformed from the qualitative interpretation presented in Table 2.

*Table 2.*  
*Scale for interpretation of results*

| Quantitative value | Qualitative interpretation |
|--------------------|----------------------------|
| 1-10               | Started                    |
| 11-15              | In process                 |
| 16-20              | Achieved                   |

Source: own elaboration

Regarding ethical aspects, the research was protected by the safeguarding of the data obtained in the collection of information, responding to the provisions of the Declaration of Helsinki and the Personal Data Protection Act N° 29733, conferring the research analysis excellence in terms of protection and ethical regulation of the private information of individuals (Cruz *et al.*, 2020).

#### 4. Results

For a better didactic understanding of the results of this research, they are presented in terms of three moments of measurement, the one carried out during the pretest, before the educational intervention, the formative ratings according to the weeks of evaluation and, finally, the evaluation during the posttest.

##### *Pretest*

Table 3 presents the results related to the measurement during the pretest, according to the items related to each of the variables under study.

*Table 3.*  
*Pretest results*

| Variable                 | N° | Items                                                                 | Started |       | In process |       | Achieved |       | Total |        |
|--------------------------|----|-----------------------------------------------------------------------|---------|-------|------------|-------|----------|-------|-------|--------|
|                          |    |                                                                       | f       | %     | f          | %     | f        | %     | f     | %      |
| Communicative competence | 1  | Use of connectors                                                     | 107     | 76.43 | 21         | 15.00 | 12       | 8.57  | 140   | 100.00 |
|                          |    | Use of punctuation marks                                              | 113     | 80.71 | 16         | 11.43 | 11       | 7.86  | 140   | 100.00 |
|                          |    | Editorial Staff                                                       | 111     | 79.29 | 15         | 10.71 | 14       | 10.00 | 140   | 100.00 |
|                          |    | Spelling                                                              | 112     | 80.00 | 17         | 12.14 | 11       | 7.86  | 140   | 100.00 |
|                          | 5  | Clarity of the ideas to be expressed                                  | 113     | 80.71 | 18         | 12.86 | 9        | 6.43  | 140   | 100.00 |
|                          |    | Consistency between paragraphs                                        | 107     | 76.43 | 21         | 15.00 | 12       | 8.57  | 140   | 100.00 |
|                          |    | Clear study objectives                                                | 117     | 83.57 | 14         | 10.00 | 9        | 6.43  | 140   | 100.00 |
|                          |    | Problem statement                                                     | 121     | 86.43 | 12         | 8.57  | 7        | 5.00  | 140   | 100.00 |
|                          |    | Determination of justification                                        | 120     | 85.71 | 11         | 7.86  | 9        | 6.43  | 140   | 100.00 |
|                          |    | The argumentative richness of the text                                | 116     | 82.86 | 17         | 12.14 | 7        | 5.00  | 140   | 100.00 |
| Competition research     |    | Evidence of research process                                          | 117     | 83.57 | 14         | 10.00 | 9        | 6.43  | 140   | 100.00 |
|                          |    | Use of various sources of livelihood                                  | 114     | 81.43 | 15         | 10.71 | 11       | 7.86  | 140   | 100.00 |
|                          |    | Coherence between text and quotations                                 | 120     | 85.71 | 11         | 7.86  | 9        | 6.43  | 140   | 100.00 |
|                          |    | Contextualization of the problem in the global and specific scenario. | 122     | 87.14 | 12         | 8.57  | 6        | 4.29  | 140   | 100.00 |
|                          |    | Clear interpretation of results                                       | 121     | 86.43 | 10         | 7.14  | 9        | 6.43  | 140   | 100.00 |
|                          |    | Enriched discussion                                                   | 120     | 85.71 | 11         | 7.86  | 9        | 6.43  | 140   | 100.00 |

Source: own elaboration

Based on the results presented in Tables 3 and 4, it can be determined that about the communicative competence variable, the participating students, on average, were in the initiated category, with 81.21%, grouping students with an average score of 7.50 points on the scale from 1 to 20. Next, there is an average percentage of 11.57% of students who are in process, with average scores of 11.03 points on a scale from 1 to 20. Finally, there is an average of 7.21% of students reached an average score of 16.05 points, placing them on the scale of achieving.

Now, concerning the research competence variable, Tables 3 and 4 reflect that, on average, 85% of the students were on the scale of initiated, with grades on the scale from 1 to 20 that on average reached 5.41 of the score. Next, 8.69% of the students reached an average score of 11.03 on the scale

of evaluation from 1 to 20, reaching the category of in progress, while only 6.31% of the participants reached the level of achieved, with average scores of 16 points on the scale from 1 to 20.

Table 4.  
Pretest grade point average

| Variable                 | Qualitative interpretation | Grade Point Average (Scale 1-20) |
|--------------------------|----------------------------|----------------------------------|
| Communicative competence | Started                    | 7.50                             |
|                          | In process                 | 11.03                            |
|                          | Achieved                   | 16.05                            |
| Research competence      | Started                    | 5.41                             |
|                          | In process                 | 11.03                            |
|                          | Achieved                   | 16.00                            |

Source: own elaboration

The results during this moment of measurement made it possible to identify and support the need for an educational intervention to promote scenarios for the acquisition of professional competencies in education students, since 92.79% of the participants lacked communication skills, while 93.69% had weaknesses in terms of research competencies.

#### ***The behavior of the sample during the intervention weeks***

Figure 2 shows the results of the formative evaluations during control weeks 5, 11, 16 and 22 of the educational intervention.

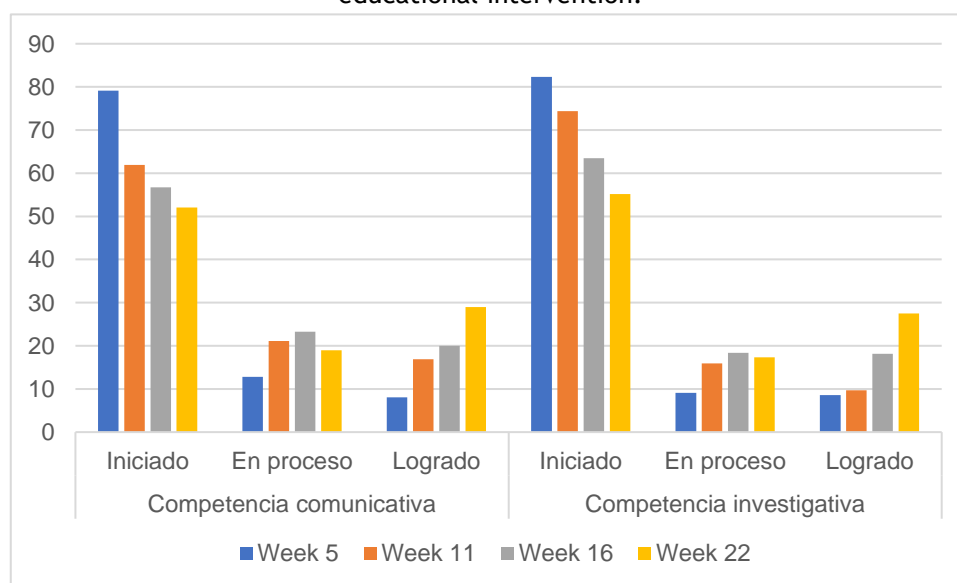


Figure 2. Weekly formative evaluations during the educational intervention

Source: own elaboration

Figure 2 shows, for the communicative competence variable, that during the fifth week of intervention, students reached an average of 79.13% of the evaluation initiated, followed by 12.82% in process and 8.05% achieved, while in week 11, a clear trend of the effectiveness of the intervention begins to be appreciated, since the percentage of students in the scale of initiated is reduced to 61.95%, approaching more towards the scale of in process with 21.13% of the cases and finally, an increase of those who reach the scale of achieved in 16.92%. The results continue this trend for week 16, as the percentage of initiated students, is reduced and is concentrated in 56.71%, followed by 23.26% who reached the scale of in the process, showing 28.97% who were located in the scale achieved. Finally, during week 22, the formative evaluation revealed that 52.05% of the students were on the initiated scale, followed by 28.97% who were on the achieved scale and only 18.98% who were in the process.

In this sense, it is important to point out that there was a reduction of 29.16% of students who were in the initiated scale, migrating towards the in-process and achieved scales, which, in the case of the latter, showed an increase of 21.76%, only in the case of formative evaluations.

Now, concerning the investigative competence, Figure 2 shows that by week 11, students were 82.3% on the scale of initiated, followed by 9.13% in process, and finally 8.57% on the scale of achieved. As with the previous competency, during week 11, the positive results of the educational intervention began to be verified, as students began to rank 74.39% on the initiated scale, followed by 15.89% in process and 9.72% achieved. The trend continued towards week 16, as students were located on average 63.45% on the initiated scale, followed by 18.4% in process and 18.15% reached the achieved scale. Finally, by week 22 of the intervention, 55% were on the initiated scale, followed by 27.46% of participants who were on the achieved scale, while 17.36% were in process.

Thus, it was determined through the formative evaluations that there was a similar behavior during the educational intervention in the case of investigative competence, obtaining a reduction of 29.82% of students who were on the scale of initiated, who gradually moved to the scales of in process and achieved, obtaining an increase for the latter of 21.15%.

### Post-test

Table 5 shows the results of the measurement after the educational intervention, considering each of the items corresponding to the variables under study.

Table 5.  
Post-test results

| Variable                 | N° | Items                                                                 | Started |       | In process |       | Achieved |       | Total |        |
|--------------------------|----|-----------------------------------------------------------------------|---------|-------|------------|-------|----------|-------|-------|--------|
|                          |    |                                                                       | f       | %     | f          | %     | f        | %     | f     | %      |
| Communicative competence | 1  | Use of connectors                                                     | 29      | 20.71 | 12         | 8.57  | 99       | 70.71 | 140   | 100.00 |
|                          |    | Use of punctuation marks                                              | 32      | 22.86 | 16         | 11.43 | 92       | 65.71 | 140   | 100.00 |
|                          |    | Editorial Staff                                                       | 28      | 20.00 | 15         | 10.71 | 97       | 69.29 | 140   | 100.00 |
|                          |    | Spelling                                                              | 29      | 20.71 | 13         | 9.29  | 98       | 70.00 | 140   | 100.00 |
|                          | 5  | Clarity of the ideas to be expressed                                  | 21      | 15.00 | 9          | 6.43  | 110      | 78.57 | 140   | 100.00 |
|                          |    | Consistency between paragraphs                                        | 26      | 18.57 | 14         | 10.00 | 100      | 71.43 | 140   | 100.00 |
|                          |    | Clear study objectives                                                | 29      | 20.71 | 9          | 6.43  | 102      | 72.86 | 140   | 100.00 |
|                          |    | Problem statement                                                     | 28      | 20.00 | 10         | 7.14  | 102      | 72.86 | 140   | 100.00 |
|                          |    | Determination of justification                                        | 32      | 22.86 | 16         | 11.43 | 92       | 65.71 | 140   | 100.00 |
|                          |    | The argumentative richness of the text                                | 21      | 15.00 | 21         | 15.00 | 98       | 70.00 | 140   | 100.00 |
| Research competence      |    | Evidence of research process                                          | 21      | 15.00 | 16         | 11.43 | 103      | 73.57 | 140   | 100.00 |
|                          |    | Use of various sources of livelihood                                  | 26      | 18.57 | 19         | 13.57 | 95       | 67.86 | 140   | 100.00 |
|                          |    | Coherence between text and quotations                                 | 19      | 13.57 | 14         | 10.00 | 107      | 76.43 | 140   | 100.00 |
|                          |    | Contextualization of the problem in the global and specific scenario. | 23      | 16.43 | 17         | 12.14 | 100      | 71.43 | 140   | 100.00 |
|                          |    | Clear interpretation of results                                       | 19      | 13.57 | 20         | 14.29 | 101      | 72.14 | 140   | 100.00 |
|                          |    | Enriched discussion                                                   | 31      | 22.14 | 19         | 13.57 | 90       | 64.29 | 140   | 100.00 |

Source: own elaboration

Taking into consideration the results presented in Tables 5 and 6, it can be seen that in terms of the communicative competence variable, the students on average reached the achieved scale in 70.71% of the cases, with average scores of 18.08 on the scale from 1 to 20. 64% of the students are still in the initiation phase, however, with average scores of 9.57 points on the scale from 1 to 20, being on the way to the level in process, which concentrates 9.64% of the students, presenting average scores of 14.16 points on the scale from 1 to 20.

Regarding the research competence variable, Tables 5 and 6 show the effectiveness of the educational intervention, in which 70.95% of the students reached the achieved level, with average scores of 17.23 points on a scale of 1 to 20. While students who are in the initiated level represent 16.55% of the cases, with average scores of 8.93 points on a scale from 1 to 20. Finally, students in the in-progress level represent 12.50% of the cases, with average scores of 14.71%, getting closer and closer to the achievement level.

Table 6.  
Post-test grade point average

| Variable                 | Qualitative interpretation | Grade Point Average (Scale 1-20) |
|--------------------------|----------------------------|----------------------------------|
| Communicative competence | Started                    | 9.57                             |
|                          | In process                 | 14.16                            |
|                          | Achieved                   | 18.08                            |
| Research competence      | Started                    | 8.93                             |
|                          | In process                 | 14.71                            |
|                          | Achieved                   | 17.23                            |

Source: own elaboration

From the results of the post-test measurement, it can be verified that the educational intervention developed had a favorable behavior for the acquisition of professional competencies in students of the first semester of education at the different faculties of education located in Metropolitan Lima, since there is a trend of reduction of students of 61. In the case of the latter, there was an increase of 63.50% in communicative competence, while for investigative competence, the increase was 64.64%.

## 5. Discussions

The results of the research reaffirmed that the didactic strategy of formative research is positive for students to acquire research and professional skills, being fundamental for universities to improve the evaluation of student performance and for society in general, since they are training professionals who will be able to meet the needs that require attention to achieve social development.

In this sense, the results of this study are related to those obtained by García *et al.* (2020), who demonstrated through an experimental study, that the results of the intervened group were positive in terms of the acquisition of communicative and investigative competencies, with effectiveness of around 65%.

Regarding the percentage differences achieved during the intervention from pretest to posttest and which are specified in the formative evaluations of the intervention, it is evident that the results are continuous and that the training process should continue, to achieve significant improvements in students and to be able to replicate in the rest of the faculties and universities in the country, as proposed by Lizaraburu Montero *et al.* (2019).

However, the research allowed recognizing that the best results of the intervention were concentrated in the communicative competencies variable, which is fundamental for teachers, because, from these, professionals will be able to communicate with their peers, but also to build a more assertive pedagogical practice with their group of students, allowing them to recognize the educational requirements and frame their didactic strategies from the reality of their groups (Espinoza Freire, 2020); also allowing them to develop in education students the need to research and communicate the results of their proposals for improvement in terms of educational quality (Fernández-Monge *et al.*, 2022).

Regarding the variable related to research skills, students achieved a successful accomplishment, completely transforming reality according to the pretest evaluation. In this case, it is essential that university students can develop these skills, so that they can continue to develop studies to generate proposals to transform social realities (Fong Silva *et al.*, 2016).

## 6. Conclusions

The proposal of training professionals by competencies came to transform the reality of university training programs, becoming the apex that helped to improve the quality of professionals graduating from higher education institutions, however, with the implementation of the formative research strategy, it turns out that these professional skills are acquired with greater intensity.

In the case of educators, considering that their graduate profile includes skills such as research, innovation and problem solving, communication and research skills are essential to fulfill the role demanded by society, to bring about the necessary transformations.


Universities should continue on the path related to USR so that it, like Diogenes' lamp, helps them to graduate professionals committed to the social transformations necessary for the improvement of social conditions, especially those related to the reduction of educational gaps.

The approach taken in this research is interesting since it was shown that the proposed educational intervention of competency-based training based on formative research is satisfactory for the achievement of current educational objectives.

Taking into consideration the emerging results of this research, it is propitious to recommend for future research to take a larger sample of universities and expand it to include various professional careers in Metropolitan Lima, to carry out comparative research.

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