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REFLECTION ARTICLE

Challenges and Opportunities of Formative Research and Research Training in Distance Education

Desafíos y Oportunidades de la Investigación Formativa y la Formación en Investigación en la Educación a Distancia

Desafios e oportunidades para a investigação formativa e a formação para a investigação no ensino à distância

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Abstract

Introduction: Formative research and research training constitute strategies and scenarios that favor the learning of higher education students and teachers attending to local needs, regardless of the medium through which the academic program is offered. **Objective:** to reflect on concepts such as research in higher education institutions, the relationship between virtual education, the research exercise and its association with the curriculum. **Reflection:** it was possible to establish the difference between formative research and research training, considering the former as the way in which the curriculum and pedagogical practice are integrated with research. On the other hand, the latter is the set of actions that favor the growth in skills and competencies required in any research process in academic and/or productive environments. **Conclusion:** formative research strengthens social sensitivity, enhances the approach to territorial needs from scientific parameters aided by technological mediation, recognizing ethical factors as the main axes in its execution.

Keywords: Research; Distance education; Higher education; Researcher training; ICT.

Resumen:

Introducción: La investigación formativa y la formación en investigación se constituyen en estrategias y escenarios que favorecen el aprendizaje de los estudiantes y docentes de educación superior atendiendo a las necesidades locales, independientemente del medio a través del cual se oferte el programa académico. **Objetivo:** reflexionar sobre conceptos como la investigación en instituciones de educación superior, la relación entre la educación virtual, el ejercicio investigativo y su asociación con el currículo. **Reflexión:** se logró establecer la diferencia entre investigación formativa y formación en investigación, considerando la primera como la forma en que se integra el currículo y la práctica pedagógica con la investigación. Por su parte, la segunda, es el conjunto de acciones que favorecen el crecimiento en habilidades y competencias requeridas en todo proceso investigativo en ámbitos académicos y/o productivos. **Conclusión:** la investigación formativa fortalece la sensibilidad social, potencia el abordaje de las necesidades territoriales desde parámetros científicos ayudados por la mediación tecnológica, reconociendo los factores éticos como principales ejes en su ejecución.

Palabras Clave: Investigación; Educación a distancia; Educación superior; Formación de investigadores; TIC.

Resumo

Introdução: A pesquisa formativa e a formação em pesquisa se constituem como estratégias e cenários que favorecem a aprendizagem de alunos e professores no ensino superior atendendo às necessidades locais, independentemente do meio pelo qual o programa acadêmico é oferecido. Objetivo: refletir sobre conceitos como pesquisa em instituições de ensino superior, a relação entre educação virtual, pesquisa e sua associação com o currículo. Reflexão: foi possível estabelecer a diferença entre pesquisa formativa e treinamento em pesquisa, considerando a primeira como a maneira pela qual o currículo e a prática pedagógica são integrados à pesquisa. A segunda, por sua vez, é o conjunto de ações que favorecem o crescimento das habilidades e competências necessárias em qualquer processo de pesquisa nos âmbitos acadêmico e/ou produtivo. Conclusão: a pesquisa formativa fortalece a sensibilidade social, potencializa a abordagem das necessidades territoriais a partir de parâmetros científicos auxiliados pela mediação tecnológica, reconhecendo os fatores éticos como eixos principais em sua execução.

Palavras-chave: Pesquisa; Educação a distância; Ensino superior; Formação em pesquisa; TIC.

INTRODUCTION

The purpose of this paper is to generate reflections on research in higher education, especially from the perspective of virtuality, and to analyze formative research and research training with all the challenges and opportunities that arise in this learning context.

For this, it is necessary to keep in mind the context of research in Higher Education in Latin America. Rama (2006) proposes three reforms that have taken place in Higher Education in Latin America; the first one establishes a model that "allowed public universities to train the professionals required by the industrialization model and the social transformation that the region carried out since the 30's of the 20th century" (p.2). However, the demand for new labor markets resulting from the industrialization process, the low quality and the economic crisis generated instability in the model. The second form was characterized by the increase of private Higher Education Institutions, the diverse study opportunities, higher education ceased to be for the elites and opportunities for access to the regions were generated and student movements emerged; however, there is no clarity regarding quality standards and research processes developed since teachers focused on professional practice and were hired part-time, only a minority had the resources to leverage research processes. Finally, a third form related to "internationalization, the new communication and information technologies and the demands for access by strongly marginalized sectors" (Rama, 2006, p.20), which allows students to access international academic programs without the need to move to the country where the institution offers them; another aspect that this form contemplates is the role of the state together with national, international and regional regulations, as well as the virtualization of education, which should be permanent; in this sense, it states that "the role of research, innovation and the generation of technologies is the central engine of growth and economic dynamics of modern societies" (Rama, 2006, p.14).

Given the above, it is clear that Latin America has made significant progress in recent decades in terms of access and educational coverage; however, there are still gaps, especially for rural populations. In relation to quality, there has been a constant challenge, especially with respect to curricula and human capital, where the difference between the institutions considered of greater prestige and the others is marked; with respect to technologies and internationalization, there is evidence of the desire to incorporate digital technologies in the learning processes that lead to the mobility of students and teachers, as well as research processes developed in a collaborative manner, as stated by Caregnato et al. (2020). "Networked research, which has grown in recent years, should be intensified due to its potential to integrate efforts, discussions and knowledge in Latin America" (p.16).

Colombia is no stranger to challenges in terms of access and coverage given the inequality between rural and urban areas. In terms of quality assurance, the government has implemented minimum standards as well as some reforms to improve the governance and efficiency of higher education institutions and thus promote research, innovation and entrepreneurship, in addition to advancing technological coverage as a gap identified in the pandemic by COVID -19.

These reflections on research in Higher Education in Colombia and Latin America are fundamental and allow us to deepen our understanding of how to develop skills and abilities for research and dynamization with the experience of teachers in the institutions.

Figure 1.
Documentary analysis procedure and document selection criteria.

Note: Own elaboration based on Martínez-Corona and Palacios-Almón (2019).

Therefore, to achieve this process it was necessary to perform a documentary analysis. According to Martínez-Corona and Palacios-Almón (2019), this is developed in four phases, which were taken into account for the selection of documents as shown in Figure 1.

1. THEORETICAL FRAMEWORK

Research in higher education

It is important to recognize research as an action in higher education that allows training professionals who read their territories to reach answers about situations of the context, as well as favoring the learning processes of students. "Etymologically, the word investigate is composed of two words from the Latin in meaning towards and vestigium meaning trace or track" (Diccionario Etimológico Castellano en línea, 2022, p. 1).

Aguirre and Jaramillo (2008), identify research as "the desire to comprehensively possess that which we do not understand and moves us to reflection, it is the insatiability to understand, to seek the disturbing, the infinite of our finitude" (p.1). Thus, research becomes an opportunity for learning and impact on the work of both the teacher and the student who wants to refine the knowledge from meaningful research actions and with the rigor that the process itself requires. The above, agrees with the considerations of (Rojas, 2015), who proposes research as a "dialectical process" (p.24), which is built in a multivariate, non-linear way, arguing that there is not a single model to do research, but it is adjusted according to the reality and situation that is studied from the scientific practice.

Research in education is aimed at generating new learning that promotes transformation and improvement processes in educational action (Asencio et al., 2017), and in coherence with the above, Villegas et al. (2018) conceive research as "a reflective, systematic and critical process of search and construction of knowledge" (p.12), which is generated from concrete, planned research proposals, and thought from the reality itself and that propitiates innovation resources for the benefit of disadvantaged communities. However, Liesa, Castelló and Becerril (2018), state that it is not possible to speak of new learning, but of a current learning culture that is framed in an educational model that focuses on learning and where its priority is the construction of knowledge beyond just receiving information.

Consequently, it is necessary that researchers contemplate "the different methods and techniques of scientific research, so that these situations are not vague or capricious, but respond to a corroborated reality" (Reynosa, 2018, p. 9), which means that research should be a systematic and pragmatic process, which favors skills in students by understanding from meaningful learning the structure that integrate research projects and how they are developed from the different phases that arise.

Quesada, 2023 states that:

> The location of the researcher in a given paradigm is the result of the answer to three questions, one of an ontological nature, that is, about the nature of reality; another epistemological question about the relationship of the researcher with the subject to be investigated; and the methodological question, which is the one that will define the procedure to be followed. (p. 244).

That is to say, each paradigm used in a research process will allow to achieve particular analyses, some starting from the interpretative, others from reflective or empirical positions, but with the common pretension of generating changes in society.

According to Rojas and Aguirre (2015), Higher Education Institutions are the ones called to lead the processes of generation of new knowledge that are achieved not only through the training process, but also through research. Thus, the above presents the imperative need to train students who see in research a training path for life, as stated by Campo & Restrepo, 1998 cited in Rojas and Aguirre (2015), "training is a process of the individual since birth and is mediated in school and society" (p. 202).

These competencies qualify the student, the future professional, in terms of their ability to understand the territories, from the learning outcomes designed from contextualized problem areas, in order to lead them to materialize the theorized (Romero Fernández et al., 2021), affirms that the institutions that guide the formative process, sustained from their pedagogy, didactics, learning outcomes and evaluation, guide the type of professionals they wish to train and the type of society they wish to build as a university and in this task, as Bravo (2010, quoted in Castro and Casanova, 2022) indicates, "a large number of disciplines converge, mainly from the social sciences and humanities" (p. 115).

In this sense, the amount of information and the order established in the research processes is achieved by articulating other disciplines that converge in the proposed objectives and that allow to establish

new knowledge for the benefit of the educational community, of the territories and also of the discipline itself. This process must be open and avant-garde, especially in this century when information technologies facilitate the search for information and the strengthening of processes.

Accordingly, institutions of higher education have a responsibility to train students capable of meeting the demands of the workplace with a wide range of skills as well as appropriate degrees (Altman et al., 2019) and in turn, minimize the likelihood of early attrition by finding them motivated as shown in studies such as those of (Upcraft et al., 2005; Tinto, 2012; Pascarella et al., 2008 cited in Lanning & Brown, 2019; Parker, 2018). This idea is also affirmed by Baron et al. (2020), who mention that the graduation rate is higher when students are significantly involved in formative research processes.

The above leads to think about the need for motivation and teacher qualification, especially in higher education, in order to include research as a way and strategy of learning from the communities established with the students and, in the same way, to promote productivity and make it known through the visibility of the new understandings generated. This allows the student to reach concerns and incline interests that favor the competencies that will be reflected in their academic performance, but also at the time of facing the working world.

One of the most relevant examples in recent years of research arising in an academic setting is the creation of the Internet, which, although it took several decades to develop, was at the University of California (UCLA), where the first data transmission was carried out in 1969 by means of ARPANET, considered the precursor of the Internet (Trigo, 2004).

Virtual education and research

Virtual education or online education refers to "didactic or training processes mediated by technology" (Sanabria, 2020, p.3), i.e., they rely on the use of the Internet and Information and Communication Technologies - ICT, for the teaching-learning processes (Tabatabai, 2020).(Tabatabai, 2020) defines virtual education as instruction in a learning environment where educators and students are separated by time or space, or both, and teachers provide course content through course management applications, multimedia resources, Internet, videoconferencing, among others.

In recent years, this modality has been booming due to its importance as a cutting-edge education, since students have the possibility of advancing in their academic activities from their territories, favoring the approach to other cultures (Sanabria, 2020). The challenge is to implement mechanisms so that students feel actively connected while working online, guaranteeing their performance and counteracting the difficulties that may arise (Ruth et al., 2022).

In this sense, in virtual education, it is worthwhile for teachers to recognize the continuous innovations regarding technological developments, allowing them to create challenges within the classroom for their students, attending to their needs, desires and aspirations, which allows them to prepare for the world of work (Lizarro, 2022). Technology encourages students' initiative to seek knowledge outside the classroom, but at the same time it provides them with the opportunity to review and revise their own knowledge.

internally prior knowledge with critical thinking and openness to new knowledge, unique learning styles among individuals, which are also influenced by their teachers, the strategies of curriculum dynamization, the institution to which they belong and the quality of the technology available for it (Oyarce et al., 2021).

In accordance with the above, Tigre and Rizzo (2023), consider that higher education institutions should strive to promote the production of knowledge and the training of researchers in both students and teachers as it is related to indicators in the processes of accreditation and high quality of academic processes. Formative research is considered an important pillar of higher education institutions, in which the creation, production and application of knowledge are aimed at responding to the changes of the globalized world, making research directly related to the economic, social and cultural progress of the country (Puicón et al, 2022).

Therefore, the challenge for university teachers in virtual education is to appropriate digital competencies that contribute to their teaching work, particularly in the use of software applied to research, such as ATLAS.ti, QSR NVivo, DATAVIV' (Le Sphinx), QDA Miner and AQUAD for the analysis of qualitative information and for the analysis of quantitative data there are software such as SPSS, DATAVIV' (Le Sphinx), Excel, R, SAS, STATA, Gandía Barbwin and JAMOVI. The above, with the purpose of analyzing large volumes of data and the use of tools for the creation of educational content (Torres and Pachón, 2021), also allows minimizing inequity in the accessibility of information of distant communities by the context of their territories, and that also require training being congruent with the models of social inclusion, mentoring networks are created and the sense of belonging in the educational community is fostered (Samad et al., 2021), in this sense, these teacher-student interrelationship processes promote investigative practices that favor formative performance through learning by doing.

Similarly, Altman et al. (2019) consider research to be the ultimate way to activate learning given that students learn to conceptualize, generate, and propose potential solutions, as well as strengthen perseverance, intergroup communication, and the ability to collaborate with others that will help them work confidently with both peers and supervisors on the job.

Research in technology-mediated higher education programs.

The importance of research in higher education programs is relevant when it is immersed in the formative process of students and promoted by the entire academic community in different scenarios. In an education mediated by technologies, these have a leading role in training and thus in research, since they facilitate student learning.

Therefore, the curriculum is the guiding plan of an educational project and is distributed from the macro curriculum that corresponds to the Ministry of Education, meso curriculum to the educational institutions and the micro curriculum to the study plans in the different programs.

Simancas and Meza (2019), state the need of the curriculum to plan, guide and execute academic activities, where converge, spaces, school, educational approaches and the nuclei of pedagogical knowledge to organize educational practice and research as part of training.

The curriculum is a construction from the pedagogical knowledge, in whose process different sources of knowledge and knowledge intervene... such as: epistemological or disciplinary source, psycho-pedagogical source and sociocultural source" (p. 9). Therefore, a curriculum that includes research can develop collaborative skills, critical thinking, and careful consumption of information (Clark et al., 2021).

According to the above, it is evident that research should be articulated in each of the levels of the curriculum, in such a way that it allows the comprehensiveness of the processes that will be reflected in the competencies of the students. In addition, students could be involved in research that favors the co-creation of curricula and thus allow involvement in the process, obtaining contributions from the different actors in favor of a transformation through the active participation of students, favoring responsibility and commitment to the teaching and learning process (Lubicz & Bovill, 2021). Bovill, 2021), which allows students to become important actors not only in the development of actions from the micro curriculum, but also in the planning at different levels, in such a way that they identify themselves as co-responsible for them.

In this same line of reflection, it is clear that the research articulated in the curriculum of higher education programs goes hand in hand with internationalization, which allows interculturality through the exchange of knowledge generated by learning communities, as stated by (Wit, 2020), "... the emphasis in internationalization has traditionally been on exchange and coo peration and there continues to be a rhetoric around the need to understand different cultures and their languages" (p.2), which is evidenced by the processes of globalization, machilerning, big data, data mining, etc., that bring the researcher closer to multiple knowledge experiences, therefore, from the curriculum it is possible to articulate students' dreams through internationalization which goes hand in hand with research and the student's possibility to achieve the encounter with other cultures and ways of interpreting realities from global perspectives with territorial postures.

Formative Research and Technology-mediated Research Training in higher education

The existing approximation between the two concepts, formative research and research training, is significant; however, although they are close in essence, it is worthwhile to identify the particularity of each one.

For Esparza and Morales (2021), Formative Inquiry (FI) is considered an aspect that "helps to develop skills in the search for knowledge that will be useful in their professional life and is more in line with the processing of the enormous amount of existing information" (p. 8). This implies an articulation of discourses in which the student is the protagonist, with the accompaniment of a teacher who, in a synergic way, advocates the development of skills and learning to learn, promoting multiple learning spaces.

These competencies and the acquisition of knowledge not only contribute to the development of skills to carry out research, but also foster specialization in an area of interest. This specialization is enriched by the various opportunities offered to students, enhancing their development through the multiple roles they assume, especially as members of research groups.

In addition, the FI is established as "the space that seeks to train in and for research, through experiential approaches that accustom the student with research, its nature, its phases and that in the long term provides the mastery of knowledge, skills and abilities" (Mirabal et al., 2020, p. 5); therefore, from this educational approach students strengthen learning in front of research processes in a practical and applied way, as an integral part of their academic training.

In addition to the above, FI is a key factor for the social development of a country from academia. As stated by Velandia et al. (2019), this form of research facilitates transformations that respond to the needs of communities, based on innovation, entrepreneurship, team collaboration, ethics and the use of technology, elements that are fundamental for promoting well-being and fostering social innovation.

Therefore, it is necessary to recognize the FI in the framework of the postulates of learning strategies, which allow the student the possibility of finding out, organizing and proposing alternative solutions to situations exposed during the training process especially in the undergraduate, these problems go hand in hand with the context such as violence, substance abuse, school coexistence, vocational orientation, armed conflict, displacement, mental health, environment and sustainability among others. Therefore, the proposed learning strategies generate psychosocial actions that aim to mitigate the problems by articulating models that allow the participation of the populations, the articulation of institutions and the interdisciplinary approach.

In this sense, higher education is recognized as an ideal space to strengthen research skills; in this way, to foster in students a culture oriented to generate projects with an impact on society in favor of well-being and sustainable development, based on the competencies achieved in the learning process and to make the results known through publications, given the productivity deficit in Latin America (Mamani et al., 2022).

Higher education institutions agree on the need to recognize FI as a transversal aspect and highlight some strategies, including research seedbeds. For (Castro-Rodríguez, 2022), research seedbeds constitute "a learning community whose purpose is to encourage the research culture and the formation of competencies in its members" (p. 1). Similarly, "Several studies have found that the interrelationship between teachers and students that is achieved in a seedbed facilitates research learning and highlights the leading role of the student, representing a leader in their pedagogical development" (Castro, 2022, p. 1). In this sense, the active participation of the student and the interaction with their peers and with the teacher is highlighted from research experiences that lead to favor learning processes and research skills.

On the other hand, it is necessary to consider training for research or training in research. For Gonzalez et al. (2007), this should encourage students to awaken curiosity, reflection, questioning, doubt from interest and thus involve new ways of understanding reality. Thus, research will be educational if those who do the research manage to develop new forms of reflection, for which they propose the need for teachers to recognize research as a process that will allow social change based on the commitment of the research community and democratic participation.

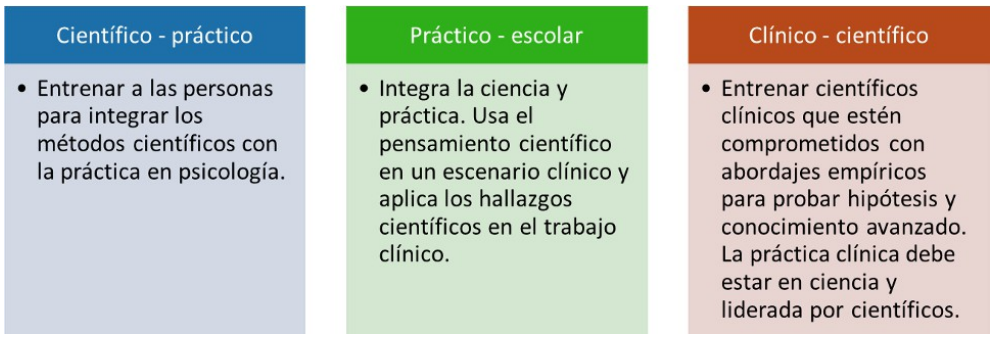
It can be said that, as a result of research training in the educational field according to

Kahn and Schlosser (2014, cited in Brad & Nadine, 2014), the following aspects emerge as seen in Figure 2.

Figure 2.
Outcome of research training

These authors also relate three models for approaching research training in a psychology program as can be seen in Figure 3.

Figure 3.
Three models for approaching research training



Therefore, FI and FI are fundamental components in the objectives of higher education institutions, promoting the generation of knowledge. These practices are essential to implement strategies that guarantee the achievement of learning outcomes, where the main focus is on the student, and the teacher acts as an ally. This is achieved from the socialization of the results of their research to the participation of students in the ongoing research processes, thus fulfilling the assigned substantive responsibilities (Esparza and Morales, 2021). This process is considered a methodological strategy guided by a teacher, in which professionals in training participate, integrating learning into their educational process.

Another important aspect in the FI and the FI are the scenarios that allow the exchange of knowledge through communication and visibility as strategies in the formative process, and in turn, the strengthening of affective bonds that arise from such interaction around topics of interest proposed by the specific themes of each seedbed.

In this regard, the lecturer González (2022), in the framework of the launching of the 2nd Congress and 12th International Symposium of Psychology: Interdisciplinarity and Transdisciplinarity in Psychosocial Praxis and 12th International Symposium of Community Social Psychology: Transformations, Challenges and Opportunities, defines the formative research model as a "space for openness, communication, and

dialogue with new knowledge" affirms that sharing failed experiences are transformed into orientations to avoid making the same mistakes or to recognize the ways to have successful experiences. There is no doubt that the seedbeds are a space for empathy and solidarity vision of knowledge, and invites to stimulate formative research, which is not done when it is oriented towards compliance with standards or criteria such as mandatory processes such as accreditation, or increase the ranking and impact factor; that is, from a productivist look which generates a sectorization of research. Research only for some... only to increase numbers, sectorization towards elite teams, placing research above the link, the environment and teaching, which generates a break between research and training, and ceases to generate dialogue. Research is distant from teaching and questions arise such as: What is the meaning of research in higher education? and What is the role of research?

Therefore, research should be the hallmark of institutional policy, a space for constant dialogue between undergraduate and graduate programs. Research as a space of openness towards students, towards new knowledge, should motivate the student as a permanent strategy, should know where new knowledge is going and teachers are part of that new knowledge, should be a classroom practice, should be transformative, committed, available to everyone and help in the decision making of the University. Research should be part of the research process, the teacher should be a teacher who researches, to know where new knowledge is going, the teacher participates in the generation of new knowledge.

Finally, it raises the question: How does the university itself contribute to the education of its students through research and study programs? (González and Medina, 2022).

Considering the above, it is necessary to mention that in Colombia the Ministry of Science, Technology and Innovation (MinCiencias), recognizes the quality and impact of research groups among others, taking into account the productivity of research seedlings in terms of human talent training, research projects developed, increased visibility and impact through research scenarios, which favors compliance with the evaluation criteria established in the observation window.

Therefore, these aspects favor FI, which goes hand in hand with FI and is understood "as a set of practices that allow the student to develop and generate an investigative competence in different scenarios" (Molina, 2017. p. 4). The competencies highlighted by the author are the ability to interpret, analyze, synthesize, critical thinking, observation, description and comparison, which lead students to strengthen their learning process through research.

These competencies are not foreign to virtual education environments where there are spaces such as the discussion forum from which to deepen and share perspectives; through guiding questions, didactics such as concept maps, mind maps, synoptic charts, persuasive maps, collaborative work, learning communities, case analysis, use of simulators, constructive feedback processes for student learning.

Similarly Ortega et al. (2017) state that to speak of scientific competence, includes fostering skills that allow "inquiry, analytical attitude, deep understanding of laws, concepts and the nature of science, for which communicative competence is required, development of the

logical, creative and critical thinking, ethics and problem-solving skills" (p.4), which are acquired in situ, with the assistance of a tutor who accompanies the training process.

From this perspective, Sánchez et al. (2021) highlight scientific research competencies such as "questioning, observational, reflective, propositional, technological, interpersonal, cognitive, procedural, analytical and communicative competencies" (p.8).

Now, research competencies must be acquired and developed through the curriculum, so that students can understand the different paradigms and approaches to research processes based on social problems, differentiate complementary approaches that allow them to implement the correspondence between epistemological, methodological and relevant praxis in research and understand the potential of research as a significant alternative for reflection and approach to scientific knowledge and knowledge construction. Thus, Castro Molinares (2017), suggests that:

Research must become the axis of the curriculum: an indisputable means for intellectual formation, which enhances the development of critical thinking and the student's ability to raise questions and address the problems of their area of knowledge and their environment. (p.168).

However, it is a priority to understand FI from the context of virtual higher education, which has become very popular in today's world, among other reasons, due to the increase in Internet coverage, the development of ICTs and the learning that the pandemic has left in society. In this regard, Ajayi et al. (2022) recommend making use of the virtual platforms developed during the pandemic to strengthen inter-institutional links, providing better and more training opportunities for the student population, also in the field of research.

It is in this context that the FI and the FI make sense, due to the possibilities for reflection that arise within a team made up of teachers concerned with their knowledge, with a profile as research teachers, interested in managing new competencies in their students (Rodríguez and Vargas, 2022).

Therefore, FI and FI are established as concepts that are closely related in the educational context; however, their approach is oriented differently; on the one hand, FI aims to strengthen learning processes by promoting student participation in research, achieving processes from research practices between the academy and the context, which strengthens skills such as critical thinking, leadership, problem solving, innovation and creativity in processes that are developed between students, teachers and the community; For its part, the FI seeks to promote student learning from the systematic structure of a research project such as planning, execution and evaluation, the formulation of hypotheses, theoretical support, methodologies that include techniques, methods, data collection, approaches, information analysis and reporting.

In Colombia, the Universidad Nacional Abierta y a Distancia - UNAD, is recognized as a mega-university with more than 250 thousand students and a consolidated research system that includes a significant number of research groups and seedlings. Its modality is virtual, which has not been an obstacle to generate significant research processes and to concern the students.

The importance of reading the territories and seeking solutions not only from applied projects, but also from contextualized research projects, and therefore defining formative research strategies from virtuality, in order to maintain the leadership of UNAD, has become a challenge for the educational community and especially for teachers who must be open to constant qualification, in order to articulate information technologies to the learning processes from research.

In this sense, Maphalala and Adigun (2021) consider necessary all types of training and capacity building in e-learning; in the infrastructure of information and communication technologies, internet accessibility and the adoption of e-learning and the use of the learning management system, becoming a virtual assistant, used in the different stages of research, from bibliometric studies, to the consolidation of research networks for the formation of academic communities.

This challenge has implied thinking and rethinking the curricula regarding the scope of research in the training processes, since higher education has a commitment from the social projection, and the training of professionals capable of solving problems with scientific rigidity (Campos et al., 2022), promoting production as a means of dissemination and systematization of the achievements obtained, and in turn, the professional performance that has sustainability over time, that is, that guarantees the application of these competencies in their professional field.

These competencies are then developed in the training process received in Higher Education Institutions, which converge in the triad, science, technology and innovation, all of them articulated from research (Córdoba, 2016). Thus, from the context of virtual education, possibilities are opened to coverage indicators and access to global knowledge; and the research culture of the teacher is favored as a guide for students from technological mediation, which was enhanced given the situation due to the Covid-19 health emergency (Casanova et al..., 2020; Ancco 2021), which implies, a teacher open to the different possibilities that his students may present, their limitations, as stated by Li and Luo (2020), a good researcher becomes a good mentor when he motivates his students to carry out reflection processes that lead to learning and practices that may occur in such research exercise.

Considering what has been exposed so far, it is believed that the research processes, either from formative research or research training, should be active within the academic process of each training program, so that students and teachers, take ownership of the realities of their territories and can meet those requirements that communities express in a timely and innovative manner.

Experiences from teaching

Higher Education plays a fundamental role in the integral formation of reflective, critical and autonomous subjects capable of facing the challenges of today's world. In this sense, FI is presented as a tool of great value for teachers, which enables the transformation of conventional academic-practical contexts, moving from a traditional way of doing to a way of performing their role from innovation, since it affects the strengthening of pedagogical practices, enabling the generation of relevant and contextualized knowledge to the

while enhancing student learning.

It is a way of transforming the learning process by promoting a culture of inquiry that is developed and maintained in the context of the classroom and whose fundamental purpose is to promote and achieve the training objectives, moving away from the separation between research and teaching, promoting the effective integration of both. Thus, it implies the understanding of its meanings and significance from a complex posture given its integrative nature both in the theoretical and applied aspects, since it implies not only having a study plan that encompasses conceptual, descriptive, analytical and critical aspects of research, but also serving as a proscenium for the conscious and determined participation of academic actors.

This process, which is nothing more than moving from the unknown to the unknown to be known in the field of the discipline and in the natural space of the classroom, anchored to the so-called teaching experiences, promotes in students an experience of text-context interaction and an opportunity to deepen their research experience with professionals with greater expertise within an institutional environment that promotes research in the humanistic and social fields. In this regard Turpo et al. (2020) refer that FI as an educational tool and/or pedagogical device, represents in essence a multidimensional system organized and oriented towards the acquisition of new knowledge and skills, based on an approach that stimulates reflection on its nature, styles, objectives and epistemological horizons explored and to be explored.

In coherence, from the teachers' perspective, promoting FI implies a constant cycle of feedback and adjustment of the formative processes that contributes to continuous professional and personal growth, fostering collaboration among peers, while promoting the exchange of experiences, the collective construction of knowledge and academic discussion. For Mendoza et al. (2019), in addition to providing training in research skills, one of the most significant aspects of FI lies in the teacher's ability to identify future researchers and connect them with scientific research processes, either through study groups (seed groups) or as part of projects developed by institutionally recognized and endorsed research groups. For this, research teachers must have skills such as empathy, observation, communication and motivation, among others, to identify the interest and research needs, thus supporting and accompanying students to strengthen learning from research.

Thus, access to these contexts constitutes a substantive opportunity provided by the FI both for the direct protagonists of the processes of inquiry and research, as well as for the training scenario itself because it is possible to consolidate spaces for continuous training in research, which is precisely the didactic function of the FI since it implies learning to learn from a constant action of the academic actors for the construction, deconstruction, reconstruction and apprehension of knowledge. Consequently, it accounts for a transforming pedagogical event that is inserted in the curriculum and is derived from and based on a set of activities aimed at problem solving (Flores et al., 2022).

In this way, the teaching activity is oriented to the development of opportunities, environments and strategies to involve students in investigative learning goals that involve the use of methodologies and procedures valid for the field of sciences, disciplines and professions, with a deep ethical conscience, settling in a role that implies a rupture of vertical forms.

The students are guided in the classroom context in such a way that they are able to problematize a situation, investigating the whys and wherefores and trying to explain the phenomena that underlie it, thus constructing their own truths. Thus, in the classroom context, the student is oriented in such a way that he/she is able to problematize a situation, investigating the whys and wherefores and trying to explain the underlying phenomena, thus building his/her own truths (Olazábal, 2020).

According to Bravo (2021), the concept of "Formative Research" refers to training and research for research through the learning process. This approach facilitates the development of competencies and skills, which are necessary to exercise a profession autonomously, so that the methodology used by the teacher plays a crucial role in the formative process from its guiding and accompanying action, by providing a process of constant and cohesive feedback with the formative purposes in terms of knowledge and its subsequent application.

The author, in the same line, refers that very beneficial results have been obtained for students through the implementation of FI, which favors learning to learn, from the management and analysis of information, critical thinking, discipline, relational and analytical thinking, as well as collaborative activities and teamwork, promoting progress in basic, disciplinary and professional skills from the dimensions of being, knowing and doing contextually.

Digital tools and platforms used by teachers and students in virtual research processes are highlighted. For the development of collaborative research (Teams, Google drive tools), for project management (Trello and Notion); reference managers (EndNote, Mendely, zotero) and instruments for qualitative analysis of information as mentioned above; which enriches the experiences from the digital world and strengthens the skills needed in this century.

Therefore, promoting the construction of knowledge through a discovery-based approach has proven to be highly effective, since students benefit from its implementation, generating a greater commitment to their learning process, based on the didactic strategies designed by the teacher, understood as those procedures used in a reflexive and flexible manner to promote the achievement of meaningful learning (Juárez and Torres, 2022).

Doing research remotely also brings challenges for teachers, especially for those who are not familiar with virtual education, since, from their experience, research in many cases required the direct use of laboratories; but the new reality brought by the pandemic allowed them to innovate in the use of other resources and tools, using technology creatively and innovating in software and applications of virtual reality (Samad et al., 2021).

Now, it is worth mentioning that not only the pedagogical and didactic components are fundamental in the implementation of FI processes, ethics as a transversal component plays a fundamental role in the integrity of scientific action and is a sine qua non condition of research exercises in the classroom and outside it; in other words, scientific integrity is nothing more than the conscious and consistent application of basic principles and ethical values in the attainment and dissemination of knowledge (Matos and Espinoza, 2015).

Therefore, from the teaching experience, the benefits of involving students in FI and FI processes from the research seedbeds have been evidenced, reflecting from the early stages the incorporation of research languages and skills in project formulation, methodologies, data collection and analysis, as well as aspects such as teamwork, situation solving, critical thinking and motivation to achieve achievements as a result of research processes and to make them visible in internal and external scenarios through national and international mobility. These aspects are also reflected in academic performance, projected in the achievement of learning results by students and in the opportunities they obtain at the time of graduation and going out into the working world by having research experiences in their profile.

2. REFLECTION

The university environment is conceived as the space through which the teacher contributes to the disciplinary formation of the educational community, contributing to the construction of a reflective, critical and liberating knowledge that contributes to the development of society. This process is gestated from the epistemo- logical bases that underlie each of the curricula, being formative research one of the determining elements to understand the steps that must be fulfilled in the construction of knowledge, linking it directly with the methods of scientific research, which "produce knowledge admitted as new and valid by the community of a discipline or specialty" (Hernández, 2003).

As can be seen, formative research is developed as a pedagogical strategy to understand the rigor with which scientific research is carried out and whose basis is the exploration of the various phases that make up a research process that inevitably contributes to the consolidation of an investigative culture in future professionals, This is coherent with the perspective of the teachers who, from their experiences, conclude that this training space facilitates the transmission of knowledge, which is applied from the different research projects that are carried out; in addition to this, the disciplinary background is enriched through academic discussions, which result in a social impact.

This social impact is clearly visible from the operation of the Regional Inter-systemic Observatory - OIR - which from a territorial approach seeks the mobilization of the living forces in the territories to act in favor of reflection and the search for actions that contribute to the solution of psychosocial problems. And it is in this scenario where the students of UNAD - are linked from the Unadista Social Service System - SISSU, to consolidate research proposals, being the communities the protagonists of the process. It is an experience that, as indicated by Esparza and Morales (2021), to develop actions and processes of collective co-construction, requires a dialogue with the territorial reality, its needs, its problems, in an ethical manner and considering different edges and actors that contribute to the understanding of the identified situations.

Similarly, within the field of virtual education, research seedlings have become spaces to strengthen competencies, not only in know-how through praxis, but also in the development of social, emotional, cognitive and affective skills to develop effectively in an increasingly demanding and demanding world.

It is clear that technological advances and e-learning are transforming the lives and ways of life of people.

learn from younger communities, and it would be pertinent to reflect on How to educate new generations so that they can face an unknown world (Eyzaguirre, 2018).

And it is precisely the teacher-student interaction, one of the scenarios that, from the research seedbeds, weaves strong socio-affective relationships, it is a space for training not only disciplinary and basic common through computer science and telematics as transversal knowledge in virtual education, but also an enhancer of soft skills such as creativity, interpersonal relationships, empathy, etc.

In this way, it is a task, sine qua non, that the student must assume, when going through the transit of research in the educational environment through permanent, reflective, continuous and systematic praxis, achieving the fulfillment of the objectives of the university whose essential function is research, training and social projection (Velandia et al., 2017), activities that focus, from their experience, on learning to learn, forging skills in their seed students, which will allow them to perform in the future, research with all the rigor that they expect for future professionals.

Thus, the primary purpose of formative research, from the teachers' point of view, is to strengthen competencies related to the generation of knowledge, awakening a critical, analytical, argumentative, creative and context-reading spirit, with notable improvements in their verbal and communicative skills. Therefore, FI is a comprehensive training strategy for students, which not only provides training and skills in research, but also strengthens their autonomy, their ability to read the context from a critical stance and reflective thinking, their ability to work collaboratively and with other disciplines, and formative research brings with it the qualification of students to strengthen their communicative competence, their ability to expose a topic, listen, read scientific articles and write manuscripts that bring them closer to the written competence, and following this, new knowledge is generated, which allows them to make systematic observations, describe, analyze and interpret, being these significant competencies of the researcher.

And one of the upcoming scenarios is evident in UNAD, through the research seedlings that from each School create spaces for training and qualification of the educational community, managing to build reflections and impacts in the regions. Thus, in the School of Social Sciences, Arts and Humanities, there is a significant number of research groups, about 88 groups that focus their work on different topics. The Sociology program, for example, publishes articles in the formative research journal Espacio Sociológico, in which the protagonists are not only teachers, but also students of the program and external researchers who contribute significantly to the reflection on rurality and social transformation.

On the other hand, the School of Agricultural, Livestock and Environmental Sciences - ECAPMA, within the spaces of Formative Research and as a scenario to make visible the research seedlings and the activities carried out in the virtual classroom, contribute through publications in its magazine, Agri- colae & Habitat on various topics where students are protagonists in these reflections.

In this regard, Espinoza and Calva (2020) state that respect for scientific integrity is manifested in different aspects within research and, in this particular case, within FI. Firstly, it refers to the planning, collection, management, conservation, processing, analysis, quality and dissemination of data and information. Secondly, it is related to the authorship and the process of

review that is carried out in outreach practices. Thirdly, there is the sphere of mentoring, which involves the relationship between a researcher (teacher) and students in the educational setting. Finally, there is collaboration based on the responsibility for fulfilling the tasks assigned to collaborators.

However, it is not enough to think of a process of ethical FI from the particularized and fragmented actions that constitute it, it is necessary to train teachers with solid ethical and democratic bases that as cognitive subjects strengthen the horizontal role mentioned above, given that as a professional implicitly shapes and models the action of their students, by becoming a reference of ethical training for those, the students, who have the responsibility to explore and understand their own identity, as well as to develop skills that enable them to interact with their environment. In this sense, as mentioned by (Salgado, 2020) ethics is revealed as a crucial aspect given that the human condition is already immersed in an established social order and the role of the teacher acts as a bridge that facilitates social dynamics through his own behavior.

3. CONCLUSIONS

Virtual education, mediated by technologies, offers the educational community the use of available tools, resources and technological platforms (cyberinfrastructure) to obtain new knowledge through simulated or in situ exercises in accordance with the dynamics of the Open and Distance Education environment.

It is evident the existing approximation between formative research and research training, understanding that FI trains researchers, that is, it starts from the understanding of the steps that lead to a research exercise, which are subject to reflection through the participation of local events that raise epistemological, methodological and disciplinary reflection. While research training - FI, involves scientific rigor, and is based on the academic interaction between teacher and student, whose objective is social appropriation and the development of skills in accordance with the guidelines of scientific research (Guerrero, 2007).

Although formative research processes contribute significantly to the acquisition of knowledge from both disciplinary and research processes, they contribute much more to the strengthening of the social sensitivity of future professionals who can read the territories and contribute to the understanding and solution of the problems that arise from them.

Research in higher education is part of the substantive functions that contribute to the personal and professional improvement of e-students and e-teachers, which enhances both their formative quality and the processes of scientific production, which is evidenced through the generation of new knowledge as articles that are generated in co-authorship with their teachers, products of social appropriation through the development of social projects that seek an impact in the territories, through the dialogic and relational processes of the different actors that in the case of UNAD are generated from the research seedlings and from the Regional Inter-systemic Observatory and finally, with products of activities related to the Training of Human Resources for CTeI, such as research projects, product of formative research.

ICTs are an effective means to carry out formative research processes through synchronous and asynchronous interaction, bringing people in remote areas closer to participate in it. Likewise, it is possible to count on the participation of researchers from anywhere in the world, enriching the research perspective of all those who work in it.

Formative research is relevant because of the interaction of both teachers and students with a common purpose of addressing a research problem that favors the selected population. Likewise, students who participate in this formative research can experience sensitivity and empathy towards the needs of a community, based on scientific methodologies.

Research training is considered of vital importance within the curriculum of a psychology program, regardless of the modality in which it is offered (classroom, distance, virtual), since it brings students closer to the various methodologies, approaches, tools and possibilities of analysis of the information collected.

In this sense, the constant interaction between research training and formative research in higher education complement each other to achieve research processes, which go beyond being an obligation, and should be based on the motivation, interests and skills of students and teachers in favor of the territory.

Finally, it is worth mentioning the importance of being ethical in any research process. Therefore, the teacher must become a guide who encourages, accompanies, listens to his students with the problems formulated and guides all research from beginning to end.

Conflicts of interest

The authors of this document declare that they have no conflicts of interest.

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