e-ISSN: 2631 - 2786
https://doi.org/10.35290/rcui.V12N1.2025

UISRAEL
REVISTA CIENTÍFICA

VOL. 12
No. 1 2025
JANUARY - APRIL

Universidad Israel

SciELO Ecuador

DOAJ DIRECTORY OF OPEN ACCESS JOURNALS

latindex catálogo 2.0

CONTENTS

LEGAL PAGE

PUBLICATION FREQUENCY – EVERY FOUR MONTHS

PUBLISHING ENTITY
Universidad Tecnológica Israel
Dirección: Marieta de Veintimilla E4-142 and Pizarro, Quito
Código postal EC-170522
editorial@uisrael.edu.ec - Phone: (02) 255-5741 ext. 113

EDITORIAL

PhD. Yolvy Javier Quintero Cordero
Editor Revista Científica UISRAEL
https://orcid.org/0000-0002-5773-2574

Dear readers, it is a great pleasure for the Board of Directors of your scientific journal Uisrael to express to you our feelings of affection and solidarity, on the occasion of the Christmas holidays, in the hope that our actions and procedures, under the guidance of divine providence, will contribute to the building of a 2025 filled with positive achievements at the family, professional and national levels.

Undoubtedly, in the course of these 24 years of the present century, the evolution of science has brought new conceptions about knowledge and its applications in the technological field, which promise to reshape the global society. Indeed, an innovative tool has emerged with exponential development: Artificial Intelligence (AI).

According to Eurostat (2021) it refers to systems that employ "text mining, computer vision, language recognition, natural language generation, machine learning, deep learning to gather or use data to predict, recommend or decide, with varying levels of autonomy, the best action to achieve the specific objectives pursued" (p: 1).

Similarly, Mena et al. (2024) argue that at the current historical juncture, AI literacy is an imperative for all citizens, since the trend of AI application in all areas of human endeavor will generate significant changes in work and personal life. For Steinbauer et al. (2021), AI literacy implies possessing the essential skills to understand, interpret, analyze and work with AI-derived technologies; these skills should be taught as early as basic education.

For their part, Tramallino and Marize (2024) point out that users often do not realize how frequently they use AI technologies. Smartphones, tablets, video games and household appliances work because there are instructions (intelligence) that allow them to act in one way or another. For the same authors, the main educational systems that use AI. are intelligent tutors, learning management, intelligent educational robotics and massive open online courses. According to Vicari (2018) some applications are:

- Adaptive learning: based on data analysis to determine the student's learning style, according to their individual progress.
- Intelligent tutors: provide feedback to the student, specifying a corrective strategy.
- Diagnostic and recommendation tools: they allow discovering the student's learning style according to his level of knowledge and learning speed.
- Gamification: transfers game-like procedures to motivate and promote student participation.
- Data mining: allows obtaining knowledge through the processing of large databases in a systematic, interactive and iterative way.
- Robotics: allows obtaining reflective knowledge from pedagogical robotic artifacts. That is, students, with the help of their tutor, can design machines to perform tasks automatically by simulating human behavior.

Now, considering the central objective of our journal as a disseminator of the research effort of our collaborators, translating significant findings into the creation of new knowledge, Haenlein and Kaplan (2019) assume that university research anchored in traditional conventional methods and techniques has been significantly impacted by the benefits that emerge from the use of AI, due to its ability to process large amounts of data, identify complex patterns and generate predictions. This not only increases the efficiency and effectiveness of research, but also opens up new areas for research. Even the ability to automate repetitive tasks has given researchers more time to improve creative and conceptual aspects of their proposals.

Despite the above, Bernilla (2024), argues that it is necessary to know the perceptions and concerns of both teachers and university students in the unavoidable presence of AI, it is key to know and understand such situations because they will allow the design of training and adaptation strategies that are effective. In this sense, for the application of AI in the research process, teachers must be adequately prepared to motivate their students in the use of this technological tool. Hence, Norman (2023) argues that it is not only to become familiar with AI. but to integrate it effectively into teaching; therefore, teachers must be "able to build content, learning tools and learning products" (p:.7).

Another aspect to consider in AI-based university research is that concerning ethics, in this regard, Coeckelbergh (2021) insists that this is based on principles of responsibility and equity; therefore, it has a bearing on the credibility, integrity and sustainability of the same. This involves the executors of the research process, the teachers as tutors of rigorous and responsible work, and the students as people aware that their level of preparation will be determined by the meaning that the

construction of their own learning has for them in line with a critical and creative thinking duly argued. Research is action learning.

What would be the role of universities in this context on AI? Pardo (2024) points out two representative options.

- Design a multidisciplinary research group to understand the institutional challenge to AI with its benefits, risks and legislation.
- Make AI implementation decisions, based on a question: what problems does the institution currently have that AI uses can help solve with a positive cost/benefit ratio?

These considerations should serve as a stimulus for a thought-provoking exercise for our universities regarding the integration of AI in the integral formation of the university student, in which scientific research plays a preponderant role.

For this year, which has just begun, we are pleased to present to the scientific community and the general public the first issue of our journal containing ten (10) scientific articles resulting from the scientific efforts of our collaborators. First, the article “Virtual environments as agents for strengthening creative thinking: a systematic review”. Its essential objective is to analyze the evidence on the role of such environments in strengthening creative thinking in education, during the period 2018-2023. The Prisma methodology was approached, 175 publications were reviewed in the Scopus, Google Scholar, Redalyc and Scielo databases. The results determine that they effectively strengthen creative thinking as they offer tools and opportunities to access global resources and encourage collaborative work.

In second place is the article “Educational level, quality of life and cognitive and functional capacity in older adults”. Its objective is precisely to determine the relationship between these variables in a group of people over 60 years of age. We worked with a quantitative methodology, with a non-experimental, cross-sectional, correlational design. A sample of 120 elderly people was selected by non-probabilistic sampling. The data collection instruments were the MoCA test to assess cognitive functions, the ViDA questionnaire to assess functional capacity, and the WHOQoL to collect data on quality of life.

The results determine that there is a relationship between educational level and functional capacity, cognitive capacity and the physical dimension of quality of life. In addition, it was found that there are significant differences with respect to cognitive capacity in all groups, while physical quality of life is higher only in the group with higher education and functional capacity showed low scores only in the group of people with primary education.

In third place is the article "Scientific production in Scopus on research competencies in university students: a systematic review. Its objective is focused on characterizing such scientific production. For this purpose, the Prisma statement was followed, 690 studies were identified and 25 were selected. It was found that 72% of the productions were quantitative studies, 56% were written in English and 44% were carried out in Peru. It is worth noting that most of the research is approached from the students' self-perception.

Fourth, the article "Educational technology and meaningful learning: impact of infopedagogical resources on teacher training". Its objective focuses, first, on analyzing the connection between staff training and the creation of meaningful knowledge in learners. Subsequently, a training program involving 67 teachers was designed. The dynamic interaction of the teachers made it possible to positively evaluate the usefulness of educational technology in the training of educators.

Likewise, there is article number five, whose objective is focused on reviewing relevant literature on educational management and soft skills in a higher technological institute (IST) generated between 2013 and 2023. To this end, the Prisma statement was addressed. After a decantation process, 30 articles were selected. After the corresponding analysis, it is concluded that educational management and soft skills play a key role in the comprehensive development of students in an IST.

In sixth place is the article "Research competencies for the design of a nuclear curriculum: systematic review". Its objective is to analyze existing experiences in the implementation of nuclear curricula, with the subsequent intention of proposing a strategy to enhance the research competencies of teachers and researchers in Ecuador. It was approached following the Prisma statement, the search was carried out in Google Scholar, selecting 34 articles that address the concept of nuclear curriculum, its relationship with medical training and science education.

The results highlight the importance of implementing a nuclear curriculum with research competencies as a crucial tool to ensure essential skills and foster research in education. Key practices such as interdisciplinary collaboration, early orientation to research projects, and the use of technologies to enhance research teaching are identified.

Seventh, an article whose objective is to know the Impact of experimental kits on the formation of scientific and practical skills in chemistry students: a systematic review (2018-2023)" is presented. For this purpose, the Prisma protocol was followed, the Scopus, Google academic and Eric databases were reviewed. In this sense, 18 articles were analyzed, and after the respective review it was concluded that experimental kits facilitate observation, interpretation of results, proper handling of instruments, formulation of hypotheses and analysis of physical and

chemical changes, as well as the evaluation of quantitative and qualitative data, among others.

In place number 8, an article whose objective is to analyze social conflicts in the public sphere and the participation of mediation in the branches of government is presented for the reader's consideration. The approach applied was descriptive and qualitative to identify trends and emerging conflicts, as well as a prospective study to understand the history of conflicts and the evolution of mediation. The results show the need to implement mediation as a state policy to effectively address conflicts and promote social cohesion.

This is followed by article number 9, which focuses on proposing a pedagogical model mediated by Information and Communication Technologies that integrates the ADDIE model and gamification to optimize educational research. The methodology is structured in five key phases of the ADDIE model (Analysis, Design, Development, Implementation and Evaluation), applied in a virtual learning environment. The results indicate that, indeed, the proposed combination significantly improves students' motivation, commitment and academic performance.

Finally, article number 10 is presented, whose objective is focused on carrying out a systematic literature review on didactic strategies to promote critical thinking in the development of communicational competences; the SALSA method is used to develop the proposed work, which consists of four important stages to identify the current situation of the topic, namely: search, evaluation, synthesis and analysis. It was possible to determine that, certainly, people's cognitive capacity needs to be stimulated through didactic strategies that develop critical thinking and communication skills. By fostering these skills, the student will be able to manage the cognitive resources necessary to handle any situation and/or social problem.

This concludes the presentation of these 10 scientific productions, hoping that they will be of interest to the avid reader. If so, our journal will have achieved its objective of disseminating new knowledge, which in turn will generate the possibility of new research.

References

Bernilla, E. (2024). Docentes ante la Inteligencia Artificial en una universidad pública del norte del Perú. Educación, vol 33, n° 64. http://dx.doi.org/10.18800/educacion.202401.m001.

Coeckelbergh, M. (2021). *Ética de la inteligencia artificial*. Ediciones Cátedra.

Eurostat. (2021). Digital Economy and Society Database.

Haenlein, M. y Kaplan, A. (2019). A brief history of artificial intelligence: on the past, present, and future of artificial intelligence. California Management, vol, n°61, n° 4. DOI:10.1177/0008125619864925.

Mena, A; Vásquez, E; Fernández, E y López, E. (2024) La inteligencia artificial y su producción científica en el campo de la educación. *Formación Universitaria, vol 17,* n°1. https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-50062024000100155.

Norman, E. (2023). La inteligencia artificial en la educación: Una herramienta valiosa para los tutores virtuales universitarios y profesores. universitarios. *Panorama*, *17*(32), https://doi.org/10.15765/pnrm.v17i32.3681.

Pardo, H. (junio-julio 2024). *Integración de IA en las universidades.* https://realcup.org/ia-en-universidades/#:~:text=Para%20nuestro%20monogr%C3%A1fico%20especial%20del,artificial%20en%20la%20educaci%C3%B3n%20superior.

Steinbauer, G; Kandlhofer, M; Chklovsky, T; Heintz, F y Koenig, D. (2021). Una discusión diferenciada sobre la educación en IA desde preescolar hasta la secundaria. *Research gate.* DOI:10.1007/s13218-021-00724-8.

Tramallino, C y Marize, A. (2024). Avances y discusiones sobre el uso de Inteligencia Artificial en educación. Educación, vol 33, n° 64. http://dx.doi.org/10.18800/educacion.202401.m002.

Vicari, M. R. (2018). *Tendências em inteligência artificial na educação no período de 2017 a 2030* (Sumário executivo). Serviço Nacional de Aprendizagem Industrial. https://www2.fiescnet.com.br/web/uploads/recursos/d1dbf03635c1ad8ad3607190f17c9a19.pdf.

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1110 • e-ISSN: 2631 - 2786

Virtual environments as agents of strengthening creative thinking systematic review

Los entornos virtuales como agentes de fortalecimiento del pensamiento creativo una revisión sistemática

Date of receipt: 2023-10-20 • Date of acceptance: 2024-09-23 • Date of publication: 2025-01-10

Sandra Patricia Rey Sánchez [1]
Universidad Ricardo Palma, Perú
Sandra.rey@urp.edu.pe
https://orcid.org/0000-0002-4724-3160

Rodolfo Santiago Vergara Calderón [2]
Universidad César Vallejo, Perú
rvergaracal@ucvvirtual.edu.pe
https://orcid.org/0000-0002-3162-6108

Abstract

Creativity is fundamental in the resolution of complex problems. Thus, with the purpose of promoting creative thinking, diverse ICTs, through the use of virtual environments, have created new digital spaces in which users can interact, explore and create. In that regard, the objective was to analyze the evidence on the role of virtual environments in strengthening creative thinking in education. The methodology was approached from the PRISMA statement, for this purpose, publications were reviewed in the databases of Scopus, Google Scholar, Redalyc and Scielo. Additionally, the search queries incorporated the terms “education”, “virtual environments” and “strengthening of creative thinking” filtered within the period from 2018 to 2023. Regarding the results, out of the 175 reviewed publications, only 20 articles underwent thorough analysis. In conclusion, it can be stated that virtual environments in education strengthen creative thinking since they offer tools and opportunities to access global resources, foster collaborative learning and offer attractive and accessible resources. In addition, they foster the generation of new ideas and creative approaches that prepare students to face the challenges of the contemporary world in an innovative and effective manner.

Keywords: Education, virtual environments, creative thinking, information and communication technologies

Resumen

La creatividad desempeña un papel fundamental en la resolución de problemas complejos. De este modo, con el propósito de promover el pensamiento creativo, las diversas TIC, mediante el uso de entornos virtuales, han generado espacios digitales en los cuales los usuarios pueden interactuar, explorar y crear. Con este propósito, se planteó como objetivo analizar las evidencias sobre el papel de los entornos virtuales en el fortalecimiento del pensamiento creativo en la educación. La metodología se abordó desde la declaración PRISMA y para ello se revisaron publicaciones en las bases de datos de Scopus, Google Académico, Redalyc y Scielo. Asimismo, las fórmulas de búsqueda incluyeron los términos “educación”, “entornos virtuales” y “fortalecimiento del pensamiento creativo”, filtrados en el periodo comprendido entre 2018 y 2023. En cuanto a los resultados, de las 175 publicaciones revisadas, 20 artículos fueron analizados exhaustivamente. En conclusión, se indicó que los entornos virtuales en educación fortalecen el pensamiento creativo dado que ofrecen herramientas y oportunidades de acceder a recursos globales, fomentan el aprendizaje colaborativo y ofrecen recursos atractivos y accesibles. Además, propician la generación de nuevas ideas y enfoques creativos que preparan a los estudiantes para enfrentar los desafíos del mundo contemporáneo de manera innovadora y efectiva.

Palabras clave: Educación, entornos virtuales, pensamiento creativo, tecnologías de la información y la comunicación

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

Virtual environments are digital spaces that allow the development of teaching and learning processes mediated by technology. They can favor students' creative thinking, understood as the ability to generate original and useful ideas to solve problems. This context aims to conduct a systematic review of the scientific literature on virtual environments and their relationship with creative thinking, in order to identify the main characteristics, benefits and challenges of training spaces. For this purpose, several databases have been consulted and the most relevant and current articles on the subject have been selected. It is hoped that this review will provide a general and critical overview of virtual environments as agents for strengthening creative thinking.

Currently, educational technology is an essential component of pedagogical practices, increasingly education relies on devices to achieve its objectives (Medina et al., 2019). Due to the increasing use of ICT in the educational system, educational institutions are making an effort in managing the changes that must be introduced to respond to the technological demands of students and meet their needs, which ultimately leads to a change in the innovative thinking processes of students (Guzmán and Moreno, 2022).

Educational institutions are urged to use e-learning processes that foster students' critical thinking, thus implying a change in traditional pedagogical postures. The ability to adapt to change is what drives creativity and distinguishes educational institutions. Therefore, innovation is crucial to improve students' academic, professional and personal competencies (Castillejo, 2022; Alarcón, 2022).

Likewise, the incorporation of virtual environments implies the need for an infrastructure that includes: (a) access to global resources, which allow students to access a wide variety of online resources from academic databases to multimedia content and information repositories; (b) collaborative learning, offer tools for online collaboration such as discussion forums and collaborative projects; c) personalization of learning, which means that students choose their study paths, activities or projects that particularly interest them; d) multimedia resources, which stimulate creativity by presenting information in an attractive way that facilitates understanding and the generation of new ideas; and e) self-directed learning, which encourages student autonomy, allowing them to take control of their own learning process (Villacis et al. 2021).

Rodriguez et al. (2018), noted that it encompasses a broad and intricate scope: in order to improve and streamline all facets of teaching and learning, educational technology takes a systems-based approach, drawing on a wide variety of tools, techniques, theories, and methods from across disciplines. This allows for more efficient and effective planning, development and evaluation of human and mechanical resources. This study compares with the proposal of Zúñiga et al. (2020) for a new research agenda in educational technology in the next millennium.

Alcívar and Navarrete (2023) have emphasized that in the current period, digital technologies are involved in more than one essential process and that, for this reason, they need hermeneutic and ethical approaches. Capurro considers it important to provide conceptual frameworks describing information systems and criteria of use in order to develop a hermeneutics of the digital society

(cited in Barrios et al., 2021). in which the introduction of computers and the internet completely altered human life. The sectors of economy, transportation, medicine and tourism will see unprecedented effects (Rodriguez et al., 2018). As a result of this pressure, education has adopted the use of technological tools to achieve its goals, giving rise to what is now known as educational technology (Guerra, 2019).

Based on the above premises, the purpose of this article is to analyze the relevant evidence on the role of virtual environments in strengthening creative thinking in education. It was also proposed to examine qualitatively the different epistemological and methodological approaches taken by researchers in their studies.

Methodology

The study that was developed followed the PRISMA 2020 model for a systematic review of scientific articles in accordance with its purpose:

2.1. Information sources search phase

Various search engines were used to compile the information, including databases such as Scopus, Google Scholar, Redalyc and SciELO, which were chosen for their relevance and ease of access to the documents for authors, reviewers and readers. Subsequently, clear inclusion criteria were established for the selection of articles, these included: a) original or review articles, b) the terms: education, virtual environments and strengthening creative thinking; c) published between 2018 and 2023; and d) disseminated in Spanish or English. Exclusion criteria were also established. These were: a) theses of any type, blogs, letters to the editor and similar, b) articles that had a minimal relationship with the subject matter, c) articles published outside the established period; and d) written in a language other than Spanish or English.

Once the keywords relevant to the study were determined, search equations were constructed by combining terms with the Boolean operator: (virtual environments “AND” strengthening creative thinking) AND (education “AND” knowledge).

2.2 Research selection phase

The selection phase included the review of publications based on the criteria established in the formulas. *Table 1* presents summary data on the information collected both before and after the application of the filters in all the databases, considering the language or query used. In turn, *Figure 1* detailed the PRISMA flowchart and the delimitation of the filters that were set for the document exclusion process. We began by discarding blog posts and letters to the editor and theses of any kind, then those that had little relation to the research topic, followed by research published before 2013 and finally studies in languages other than Spanish or English. This resulted in a total of 20 papers that were carefully reviewed and thoroughly analyzed.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

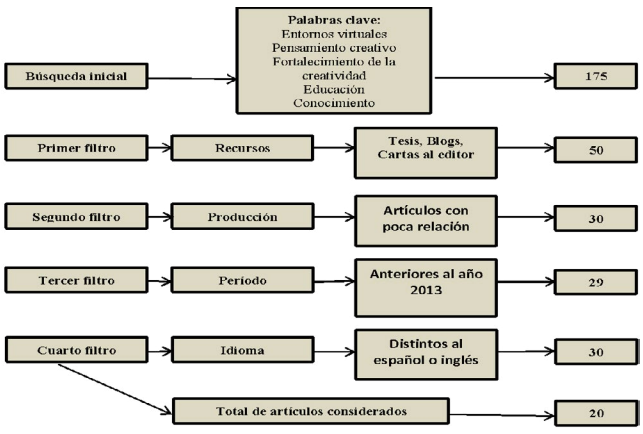
Table 1

Results obtained from each database according to the established search formula

Base de datos	Fórmula de búsqueda (en español y en inglés)	No. de resultados	N° de resultados después de aplicar los criterios de inclusión y exclusión
Scopus	Entornos virtuales "AND" fortalecimiento del pensamiento creativo; virtual environments "AND" strengthening creative thinking; Educación "AND" conocimiento. education "AND" knowledge	29	3
Google Académico	Entornos virtuales "AND" fortalecimiento del pensamiento creativo virtual environments "AND" strengthening creative thinking; Educación "AND" conocimiento. education "AND" knowledge	85	8
Redalyc	Entornos virtuales "AND" fortalecimiento del pensamiento creativo virtual environments "AND" strengthening creative thinking; Educación "AND" conocimiento. education "AND" knowledge	29	4
Scielo	Entornos virtuales "AND" fortalecimiento del pensamiento creativo virtual environments "AND" strengthening creative thinking; Educación "AND" conocimiento. education "AND" knowledge	32	5

Figure 1

PRISMA flow chart.



2.3 Information extraction phasen

After carrying out the process described in *Table 1*, the articles reviewed were presented in a synthetic manner in a matrix in which only those that were selected were included (*Table 2*).

This allowed us to obtain a broader perspective and a logical organization of the data, in order to facilitate reading and understanding by the target audience. In this way, the information was presented in a clear and concise manner.

Table 2

Matriz de Síntesis.

No.	Año	Autores	Título	País
1	2021	Frison y Russo	Constituyendo transicionalidad y devenir: virtualización del espacio educativo, interrogantes y estrategias desde un pensamiento creador	Argentina
2	2021	Aragundi y Game	Enseñanza creativa en entornos virtuales para el desarrollo de competencias emocionales	Ecuador
3	2018	Hernández et al.	Desarrollo de competencias de pensamiento creativo y práctico para iniciar un plan de negocio: diseño de evidencias de aprendizaje	México
4	2019	Medina et al.	El desarrollo de la creatividad en la formación universitaria	Ecuador
5	2019	Suárez et al.	Desarrollo de la Creatividad y el Talento desde las Primeras Edades. Componentes Curriculares de un Programa de Maestría en Educación	Ecuador
6	2022	Guzmán y Moreno	Evaluar el pensamiento creativo en estudiantes de arquitectura	México
7	2022	Castillejo	Inteligencia artificial y entornos personales de aprendizaje: atentos al uso adecuado de los recursos tecnológicos de los estudiantes universitarios	México
8	2022	Alarcón	Influencia de la enseñanza virtual en el pensamiento creativo	Perú
9	2022	Delgado	Estrategias didácticas para fortalecer el pensamiento creativo en el aula. Un estudio metaanalítico	Perú
10	2019	Guerra	Una revisión panorámica al entrenamiento de las habilidades blandas en estudiantes universitarios	Colombia
11	2020	Aguilar	Del aprendizaje en escenarios presenciales al aprendizaje virtual en tiempos de pandemia	Ecuador
12	2020	Marcillo	Agentes tutores para la enseñanza	Colombia
13	2018	Rodríguez et al.	Implementación de un entorno virtual como herramienta didáctica para fortalecer el proceso enseñanza aprendizaje	Cuba
14	2020	Casar et al.	Desarrollo de la creatividad en cursos a distancia a través de entornos virtuales de aprendizaje	Cuba
15	2020	Murillo	Estrategias educativas y tecnología digital en el proceso enseñanza aprendizaje	Perú
16	2020	González y Martínez	Dilemas éticos en el escenario de la inteligencia artificial	Cuba
17	2020	Lengua et al.	Tecnologías emergentes en el proceso de enseñanza aprendizaje: hacia el desarrollo del pensamiento crítico	Colombia
18	2020	Zúñiga et al.	El nuevo enfoque de participación docente ante los retos y desafíos tecnológicos de la cuarta revolución industrial 1	Perú
19	2021	Barrios et al.	Propósitos de la educación frente al desarrollo de la inteligencia artificial	Colombia
20	2023	Alcívar y Navarrete	Estrategia metodológica para el fortalecimiento de las competencias digitales docentes	Ecuador

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

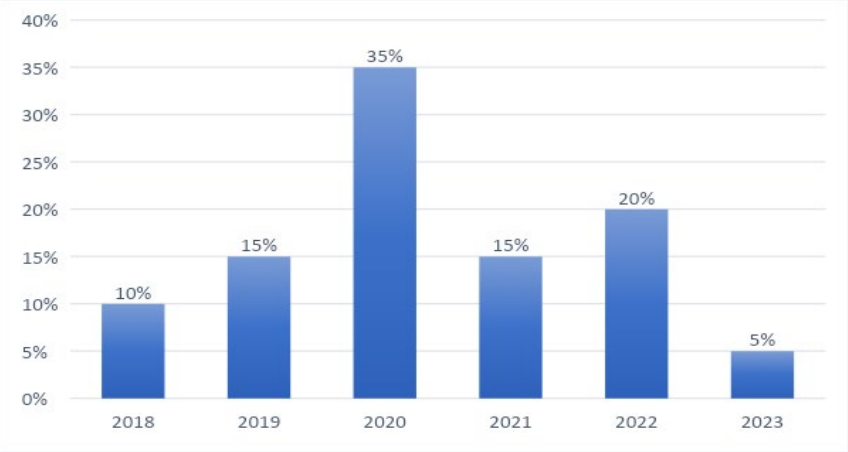
Consequently, the results of the analysis of digital competencies in the knowledge era were presented. New approaches from artificial intelligence. This acknowledges the distinctive contributions of the research considered within the present study.

2.4 Articles by year of publication

Making use of the data obtained from the systematic review and exposed in the synthesis matrix established in *Table 2*, the trend in research according to the year of publication was presented, this is shown in *Figure 2*.

Figure 2

Articles by Year of Publication.



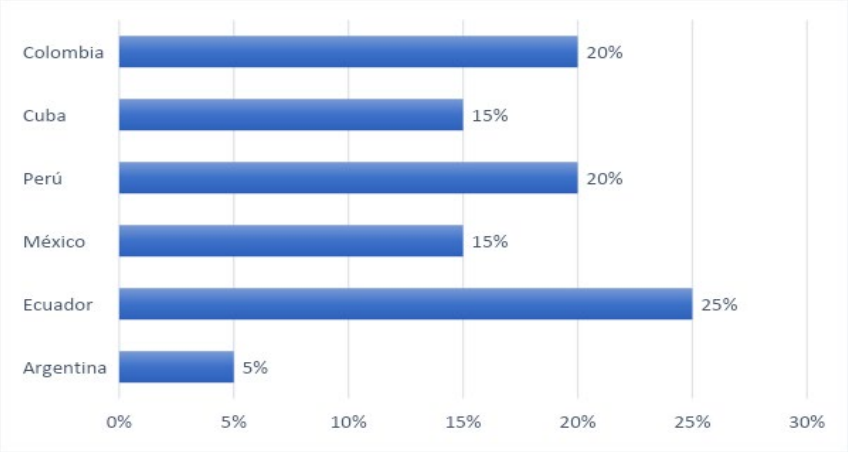
After examining the content of the 20 scientific publications selected to structure the systematic review, it was possible to concatenate the information corresponding to the variable of analysis in question. As evidenced in *Figure 2*, the majority of resources is positioned in 2020 represented by 35% (7) of the scientific resources; for its part, the year 2022 establishes 20% (4) of articles, for the years 2019 and 2022 it is established that there is a predominance of publication of 15% (3). Finally, for the years 2018 and 2023 there is a publication percentage of 10% (2) and 5% (1) respectively.

2.5 Publications by country of origin

Figure 3 shows the results of the studies reviewed, taking into account the country of origin of each one of them. The results are as follows:

Figure 3

Publications by country of origin.



By country of origin, it was found that there is a significant relevance for research on the topic and, in order of the number of publications that address it, Ecuador is the country with the highest number of selected publications, with 25% (5); countries such as Colombia and Peru 20% (4); 15% (3) in countries such as Cuba and Mexico; and finally, 5% (1) in Argentina.

Results

The results of the articles analyzed showed that virtual environments do indeed contribute to and can strengthen creative thinking. Creative thinking is a complex cognitive process that involves the generation of original and novel ideas, as well as the ability to innovatively combine previously known concepts and elements. The cognitive processes associated with creative thinking are fundamental to problem solving, creative decision making, and the creation of artistic and scientific works (Vázquez, 2021). Today's online classrooms encourage students to think creatively while learning, but this does not happen by chance; rather, teachers must invest time and effort in first developing their own digital competencies, so that they can then adapt and integrate into their activities, dynamics and didactic strategies focused on the learning process of their students.

This way of meeting the objectives with the mediation of devices forces teachers to expand their knowledge and links them to educational technology, improving both the teaching process and the use of these new technological tools (Marcillo, 2020). However, ICT is not only focused on technology, but also to the use of information and communication to achieve quality education (Guerra, 2019).

In this sense, an important number of the selected research emphasized the teacher's responsibility in adjusting their traditional classroom practices to learning situations mediated by virtual environments. Given that the changes have affected both the way in which they organize classes and the students' own learning experience. However, it is also important to highlight that online education poses challenges, among which are, the need to maintain high levels of motivation and

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

self-discipline on the part of students, effective time management and the adaptation of teachers to new ways of teaching (Zuñiga et al, 2020). Likewise, not all students have equal access to technology and a high-speed internet connection, which can generate inequalities in access to online education. Therefore, the effective implementation of virtual environments in education requires considering these challenges and seeking solutions to address them (Lengua et al. 2020).

From the above, it could be seen that in the articles analyzed in depth it was confirmed that virtual education can be useful for students to develop skills to critically analyze information, make decisions autonomously, reach answers using other means, be more creative, innovative and productive. To this end, in the articles the teachers posed novel strategies to address challenges, posed questions with the aim of obtaining creative solutions. Therefore, it is crucial that teachers cultivate their skills by taking advantage of technological tools and encouraging the development of their creative capacity in their educational activities (Aguilar, 2020).

As has been explained, students can be more innovative and creative when they have access to a wide variety of digital tools for the creation and dissemination of knowledge, as analyzed by Rodríguez et al. (2018). These count among their strengths the management of virtualization and the use of technological resources in teaching and learning situations. Within the limits of this research, it was possible to understand the role played by the educator in the management of educational environments and their ability to incorporate strategies and resources of virtuality, not only in knowledge acquisition, but also in the expansion of their skills to explore their creative capacity (Casar et al., 2020).

For its part, creativity as the ability to identify defects in a given object, create and test novel hypotheses and present results, is a skill of divergent thinking. It is based on fluency, adaptability and originality in thinking, awareness of problem solving and redefining previously held concepts. From the activation of the learning process, Alarcón (2022) highlighted the importance of critical thinking that will allow students not only to be more critical, creative and autonomous in their approach to problem solving, but also to broaden their routes to think creatively. Delgado (2022) concluded that teaching-learning processes supported by ICT positively affect students' academic performance, leading to greater student autonomy and responsibility.

Guzman and Moreno (2022) concluded that ICTs are crucial for global higher education, particularly with regard to distance education and considering the resources provided by technology to assist students in their education. Castillejos (2022) argued that the use of ICT is crucial for online knowledge creation in education. The use of a personal technological device that manages educational processes is integrated into the dialogue between teacher and student. It also takes into account the technologically enhanced learning environment known as virtual classroom, in which students are encouraged to actively participate in creative problem solving during a class session to generate meaningful learning and access relevant information (Frison and Russo, 2021).

According to Aragundi and Game (2021), a new educational technology research agenda is proposed for the next millennium. First, it is proposed that studies be conducted to determine whether or not the purported benefits of technology exist and whether or not the claimed methods and programs are effective (Medina et al., 2019). Researchers believe that the most useful studies

will be those that attempt to demonstrate whether or not certain technology-based methodologies have the potential to achieve unique and consistent benefits in response to a specific category of educational problems (Guzman and Moreno, 2022). If there is a way to implement technology-based methods that are already widely used and are intended to increase their influence on student achievement, retention, and satisfaction, then they will need to be used. Advances made by understanding some of the most crucial educational objectives for technology (Castillejo, 2022).

Consequently recent experiences, due to the health crisis, demonstrated that distance education, according to Lengua et al. (2020) is the vanguard of education because it allows students to participate from anywhere, taking charge of their own learning and acquiring knowledge in novel and efficient ways thanks to the use of technological tools (Zúñiga et al., 2020). Online learning emphasizes open and continuous dialogue between instructors and students to foster bidirectional and multidirectional communication in which listeners become speakers and teachers become learners, respectively. This helps to guide and train students more autonomously throughout the learning process (Gonzalez and Martinez, 2020).

In universities around the world, ICTs are a fundamental tool for developing students' critical thinking and influencing the way they are taught to adapt to changing circumstances. Administratively, they help educational institutions streamline their operations by leveraging digital platforms; from the curricular point of view, they help students generate knowledge and provide them with access to relevant educational and creative resources (Alcívar and Navarrete, 2023).

Thus, in the opinion of Barrios et al. (2021), the key periods are those of exploration, integration and innovation. Exploration is carried out through the use of ICTs in the educational setting, reinforcing teachers' confidence in the use of technological aids in the classroom. The second phase of integration consists of establishing connections between the knowledge acquired and the experiences obtained during exploration, with the objective of implementing the appropriate use of ICT in education through the use of available resources (Lengua et al., 2020). Third, the innovative moments give rise to various learning strategies that are then used in each class meeting and, finally, the innovative experiences that result in pedagogical changes are evaluated. Finally, these moments have diverse effects; for example, in some cases they inspire creative ideas of new application (Vargas, 2020).

Within this line of thought, Aguilar (2020) expressed that ICTs at present group spaces, interactions, devices, languages, exchanges and even concepts, which are present in all areas of social life. These have revolutionized education by expanding access to information and learning, fostering collaboration, personalizing teaching and providing analysis tools (Marcillo, 2020). It is crucial that educational institutions use ICTs from the proper management by teachers so that all students have access to the same opportunities and can take advantage of the benefits of cutting-edge technological resources (Alarcón, 2022). The appropriate use of technology in education can improve teaching and learning, foster more democratic and inclusive classroom environments, and help students work together to solve problems using their creative problem-solving skills and scientific knowledge (Guzmán and Moreno, 2022).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

In this sense, it could be seen that currently Latin American universities recognize the importance of educational innovation with ICTs, so it is argued that the incorporation of ICTs in the classroom is crucial not only to foster creative thinking. From this point of view, several studies have shown that creative thinking can be fostered through online education (Suárez et al., 2019).

From another perspective, the study by Medina et al. (2019) recognized that the gradual incorporation of technology in the educational process leads to an improvement in critical and creative thinking. On the other hand, Castillejos (2022) argued that it is possible to improve students' creative thinking within the learning environment of massive open online courses. This allows affirming that in all the texts analyzed there is an important trend about the role of virtual environments in fostering greater individual and group creative performance, as well as the emotional aspects associated with the enjoyment and fun involved in this way of learning.

Likewise, it is recognized that the relationship between technological, sociocultural and pedagogical elements is crucial in the virtualization of education (Alcívar and Navarrete, 2023). Therefore, it is necessary to incorporate these factors in virtual education to foster creative thinking. In this regard, Barrios et al. (2021) emphasized that the use of multimedia tools to improve students' creative thinking skills at the university level. Likewise, a previous study highlights the use of a mobile application integrated with realistic mathematics education to foster the development of creative thinking skills in elementary school (Lengua et al., 2020).

As it has been established that students' digital literacy and ICT skills are important predictors of their creative thinking abilities (Casar et al., 2020), more and more research is being conducted to assess students' creative thinking in STEAM education (Rodriguez et al., 2018). According to Marcillo (2020), distance learning represents the next generation in education, with ICT serving as a crucial information and communication hub for today's students. Both Aguilar (2020) and Delgado (2022) stated that the use of alternative forms of innovation in online education leads to the development of more autonomous, critical and creative individuals.

For their part, Casar et al. (2020) in their work found that current graduates from various universities need to constantly update their skills and knowledge. Due to these drawbacks, online learning has emerged as a viable option to prepare future professionals. Today, educational virtualization (Alcívar and Navarrete, 2023) is experiencing a boom and positive transformation and is presented as a flexible, effective and viable option for providing quality education. Innovation is a key component of online education, and has a positive impact on the field as a whole (González and Martínez, 2020).

In this sense, it is recognized that despite the continuous development the pace of this virtual method is linked to changes in methodology, technology and society (Aguilar, 2020). The student is the protagonist of his learning because he understands that he is the personal constructor who creates his theories in light of the new technological paradigms, which also continue to contribute to intellectual capacity as part of a symbology that increases the levels of abstraction, autonomy and creativity (Medina et al., 2019).

Despite how extensive and diverse the literature review has become, aspects that were not considered or were addressed in a superficial manner continue to be observed. Among these are: the availability of data, the biases associated with the testing of some of the hypotheses formulated by the researchers, the diversity of virtual environments and the limitations that this may mean for making generalizations about the results, the rapid evolution of the technology of virtual environments that makes research lose validity in the short term. Finally, it should be pointed out that if a critical and comprehensive systematic review is to be prepared, the aforementioned factors should be taken into account, and these may give rise to new studies if the aforementioned factors are taken into account, which may be developed in another way, giving rise to new studies.

Conclusions

Based on the paragraphs provided, it could be inferred that virtual environments play a crucial role in strengthening creative thinking in education. The effective integration of Information and Communication Technologies (ICT) in pedagogical processes and virtual education has shown to have a positive impact on the development of students' critical and creative thinking. This effect was attributed to several factors such as the ability of ICTs to provide personalized learning and stimulate creative interaction among students.

Virtual environments facilitate broad access to diversified resources and allow the implementation of innovative methodologies that can motivate students to think more imaginatively and autonomously. Furthermore, the scientific literature reviewed supports the idea that online learning can enrich students' creative abilities, provided that educators make creative thinking a priority and continuously train in digital competencies. This suggests that not only the technology itself, but also how it is used and how teachers are trained to integrate it into teaching, are determining factors in the impact of virtual environments on creative thinking in education.

Therefore, to maximize the benefits of virtual education in the development of creative thinking, it is essential that educational institutions engage in a reflective and strategic implementation of technologies, supporting teachers in their training and continuously adapting pedagogical practices to the changing needs of the digital environment.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

References

Aguilar, F. (2020). Del aprendizaje en escenarios presenciales al aprendizaje virtual en tiempos de pandemia. *Estudios Pedagógicos (Valdivia), 46*(3), 213-223. http://dx.doi.org/10.4067/S0718-07052020000300213

Alarcón, N. (2022). Influencia de la enseñanza virtual en el pensamiento creativo. *Maestro y Sociedad, 19*(4), 1528-1537. https://maestroysociedad.uo.edu.cu/index.php/MyS/article/view/5704/5508

Alcívar, Y. y Navarrete, Y. (2023). Estrategia metodológica para el fortalecimiento de las competencias digitales docentes. *Estudios del Desarrollo Social Cuba y América Latina, 11*(1), 33-49. https://revistas.uh.cu/revflacso/article/view/336

Aragundi, K. y Game, C. (2021). Enseñanza creativa en entornos virtuales para el desarrollo de competencias emocionales. *Innova Educación, 3*(4), 71-82. https://doi.org/10.35622/j.rie.2021.04.005

Barrios, H., Díaz, V., y Guerra, Y. (2021). Propósitos de la educación frente a desarrollos de la inteligencia artificial. *Cuadernos de Pesquisa, 51*. https://doi.org/10.1590/198053147767

Casar, L., Villanueva, M., y De Armas, N. (2020). Desarrollo de la creatividad en cursos a distancia a través de entornos virtuales de aprendizaje. *Serie Científica de la Universidad de las Ciencias Informáticas, 13*(3), 11-21. https://dialnet.unirioja.es/servlet/articulo?codigo=8590255

Castillejos, B. (2022). Inteligencia artificial y entornos personales de aprendizaje: atentos al uso adecuado de los recursos tecnológicos de los estudiantes universitarios. *Educación, 31*(60), 9-24. http://dx.doi.org/10.18800/educacion.202201.001

Delgado, C. (2022). Estrategias didácticas para fortalecer el pensamiento creativo en el aula. Un estudio metaanalítico. *Revista Innovación 4*(1), 52-64. https://dialnet.unirioja.es/servlet/articulo?codigo=8152451

Frison, R. y Russo, S. (2021). Constituyendo transicionalidad y devenir: virtualización del espacio educativo, interrogantes y estrategias desde un pensamiento creador. *Revista Iberoamericana de Tecnología en Educación y Educación en Tecnología,* (28), 352-358. http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S1850-99592021000100045

González, M. y Martínez, D. (2020). Dilemas éticos en el escenario de la inteligencia artificial. *Economía y Sociedad, 25*(57), 93-109. http://dx.doi.org/10.15359/eys.25-57.5

Guerra, S. (2019). Una revisión panorámica al entrenamiento de las habilidades blandas en estudiantes universitarios. *Psicología Escolar y Educacional, 23*. https://doi.org/10.1590/2175-35392019016464

Guzmán, Y. y Moreno, J. (2022). Evaluar el pensamiento creativo en estudiantes de arquitectura. *Revista Conrado, 18*(85), 389-396. http://scielo.sld.cu/pdf/rc/v18n85/1990-8644-rc-18-85-389.pdf

Hernández, J., Jiménez, Y., y Rodríguez, E. (2018). Desarrollo de competencias de pensamiento creativo y práctico para iniciar un plan de negocio: diseño de evidencias de aprendizaje. *RIDE, 9*(17), 314-342. https://doi.org/10.23913/ride.v9i17.383

Lengua, C., Bernal, G., Flores, W., y Velandia, M. (2020). Tecnologías emergentes en el proceso de enseñanza aprendizaje: hacia el desarrollo del pensamiento crítico. *Revista Electrónica Interdisciplinaria de Formación del Profesorado, 23*(3), 83-98. https://doi.org/10.6018/reifop.435611

Marcillo, D. (2020). Agentes tutores para la enseñanza. *Pensamiento y Acción, 28,* 61-82. https://doi.org/10.19053/01201190.n28.2020.11165

Medina, R., Franco, M., Gallo, M., y Torres, A. (2019). El desarrollo de la creatividad en la formación universitaria. *Revista Cubana de Medicina Militar, 48*(1). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0138-65572019000500007

Rodríguez, K., Pérez, J., y Torres, G. (2018). Implementación de un entorno virtual como herramienta didáctica para fortalecer el proceso enseñanza aprendizaje. *EDUMECENTRO, 10*(4), 54-71. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2077-28742018000400004

Suárez, N., Delgado, K., Pérez, I., y Barba, M. (2019). Desarrollo de la Creatividad y el Talento desde las Primeras Edades. Componentes Curriculares de un Programa de Maestría en Educación. *Formación Universitaria, 12*(6), 115-126. http://dx.doi.org/10.4067/S0718-50062019000600115

Vargas, G. (2020). Estrategias educativas y tecnología digital en el proceso de enseñanza aprendizaje. *Cuadernos, 61*(1), 69-76. http://www.scielo.org.bo/pdf/chc/v61n1/v61n1_a10.pdf

Vázquez, S. (2021). Estrategias del pensamiento creativo: una mirada desde la educación básica. *Revista Innova Educación, 3*(4), 110-122. https://doi.org/10.35622/j.rie.2021.04.008

Villacis, M., Moreno, M., y Benavides, R. (2021). Entornos virtuales como espacios de enseñanza-aprendizaje. "Un enfoque teórico para la educación superior". *Horizontes, 5*(9), 695-708 https://doi.org/10.33996/revistahorizontes.v5i19.230

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1157 • e-ISSN: 2631 - 2786

Educational level, quality of life and cognitive and functional capacity in older adults

Nivel educativo, calidad de vida y capacidad cognitiva y funcional en adultos mayores

Date of receipt: 2023-12-15 • Date of acceptance: 2024-09-26 • Date of publication: 2025-01-10

Ana Marquez Terraz [1]
Universidad Nacional de San Luis, Argentina
terrazama@gmail.com
https://orcid.org/0000-0002-5718-087X

Lucía Victoria Centorbi [2]
Pontificia Universidad Católica, Argentina
luciacentorbi@uca.edu.ar
https://orcid.org/0009-0005-9770-135X

Ivana Belén Diaz [3]
Pontificia Universidad Católica, Argentina
ivanadiaz@uca.edu.ar
https://orcid.org/0009-0001-8260-5710

Abstract

The objective of this research was to verify the relationship between educational level, quality of life, functional capacity and cognitive abilities in a group of people over 60 years of age. Quantitative methodology was used, with a non-experimental, cross-sectional, correlational design. A sample of 120 older people was selected through non-probabilistic sampling and divided into: people with complete or incomplete primary education, people with complete or incomplete secondary education, and people with complete or incomplete higher education. The data collection instruments were the MoCA test to evaluate cognitive functions, the ViDA questionnaire to evaluate functional capacity, and the WHOQoL to collect data on quality of life. It was confirmed through the Chi-square test that there is a relationship between the level of education and functional capacity, cognitive capacity and the physical dimension of quality of life. Using the Mann-Whitney U test, it was found that there are significant differences regarding cognitive ability in all groups. Thus, emphasis was placed on formal education as a necessary instance for healthy aging, which must be accompanied by informal education strategies.

Keywords: Old age, quality of life, education, functional status, cognition

Resumen

El objetivo de la presente investigación fue constatar la relación existente entre el nivel educativo, calidad de vida, capacidad funcional y capacidades cognitivas en un grupo de personas mayores de 60 años. Se utilizó la metodología cuantitativa, con diseño no experimental, transversal, correlacional. Se seleccionó una muestra de 120 personas mayores, mediante muestreo no probabilístico y divididos en: personas con primaria completa o incompleta, personas con estudios secundarios completos o incompletos y personas con estudios de nivel superior completos o incompletos. Los instrumentos de recolección de datos fueron el test MoCA para evaluar funciones cognitivas, el cuestionario ViDA para evaluar la capacidad funcional, y el WHOQoL para recoger datos sobre la calidad de vida. Se constató mediante la prueba de Chi-cuadrado que existe una relación entre el nivel de estudios y la capacidad funcional, la capacidad cognitiva y la dimensión física de la calidad de vida. Mediante la prueba U de Mann-Whitney se encontró que existen diferencias significativas respecto a la capacidad cognitiva en todos los grupos. Así, se hizo hincapié en la educación formal como una instancia necesaria para el envejecimiento saludable, que debe ser acompañada por estrategias de educación informal.

Palabras clave: Anciano, calidad de vida, educación, estado funcional, cognición

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

It is well known that education plays a crucial role in the comprehensive development of individuals. Schools provide an environment conducive to strengthening skills and abilities in social, physical, cognitive, and emotional areas. This is why it is proposed that the education received in the early stages will influence the rest of a person's life (Santi, 2019).

Education, particularly formal education, is considered to provide individuals with access to a better future. Formal education, in this case, refers to education that follows conventional methods, is consciously and systematically developed in educational institutions designed for this purpose, and is recognized by government bodies as such (Jiménez, 2020).

Given this information, it is of interest to understand and determine what a better future means. This research aimed to explore the effects of formal education on the healthy aging of older adults. Specifically, it sought to determine whether formal education influences the way individuals age. Three key variables were considered in this life stage: functional capacity, cognitive function, and quality of life.

It is worth noting that evidence of the relationship between education level and cognitive function has been extensive and consistent. Multiple studies have found that the higher the education level of an individual, the better their cognitive functioning in later adulthood.

As an example of this relationship, the research by Vite and Calderón (2018) found in a sample of older adults that education level is a predictor of cognitive functioning in old age. Additionally, the study by León Samaniego and León Tumbaco (2018) found that having a basic education level is a risk factor for cognitive decline. In this same vein, research has shown that education level plays a significant role in determining certain cognitive functions, such as sustained and selective attention, as well as abstract reasoning, regardless of the complexity of tasks individuals have performed throughout their lives. This information suggests that cognitive skills acquired during schooling could be maintained throughout life and not be significantly affected (Feldberg et al., 2020).

The relationship between education level and cognitive functioning is explained by the theory of cognitive reserve. This theory posits that individuals differ in the way they process information. These differences may allow some people to cope with nervous system alterations, such as those that occur in aging, without showing significant cognitive difficulties. These skills for processing information more flexibly are acquired through various activities that do not necessarily relate to intellectual activity (Villa, 2017), with one of the main activities being participation in formal education.

The relationship between education level and quality of life, on the other hand, is less clear. Studies conducted with older adults have found that higher education levels are associated with better perceived health and higher health-related quality of life (López et al., 2019). Evidence has also shown that education level contributes to the physical and psychological dimensions of quality of life (Cardona et al., 2016). However, other studies have found no statistically significant relationship

between education level and quality of life in older adults (González and Araujo, 2010; Mesa et al., 2020; Tenorio et al., 2021).

These differences in the findings from various studies may stem from difficulties in defining this construct. Quality of life is a complex concept, with both objective and subjective aspects, each of which has multiple dimensions. However, subjective quality of life has taken center stage due to its ability to predict an individual's overall quality of life. It can be defined as an emotional appraisal and cognitive evaluation of a person's current living conditions, taking into account different domains, such as social, psychological, physical, or environmental factors (Marquez, 2022). There is not necessarily a linear relationship between subjective quality of life and the objective conditions in which a person lives; thus, it is possible that education level does not directly impact this variable.

Finally, the relationship between education level and functional capacity has more consistent evidence, although it is also more limited. It has been reported that there is a relationship between education level and the functional capacity of older adults, as measured by the Barthel Index (Satorres, 2013) and the Katz Index (Cortés et al., 2016). Both scales assess basic activities of daily living, such as dressing, personal hygiene, or eating independently. These are basic self-care activities that must be performed to ensure survival.

On the other hand, Luna and Vargas (2018) found that having 8 or more years of schooling was a protective factor against functional decline in instrumental activities of daily living, assessed using the Pfeffer Functional Scale. These activities are more complex and serve as a means to achieve other goals. For example, this category includes tasks such as managing money, a skill involved in various daily tasks, or using different forms of transportation to facilitate the completion of numerous activities.

Methodology

The methodology used was quantitative, as the variables were quantified, for which psychometric measurement instruments were used. The design was non-experimental because no voluntary manipulation of variables was performed; moreover, it was cross-sectional as data were collected at a single moment in time. The research level was correlational since the relationship between educational level, cognitive functioning, functional capacity, and quality of life in older adults was explored (Hernández and Mendoza, 2018).

2.1. Sample

The sample was collected using the voluntary participant sampling method, meaning visits were made to centers that provided activities for older adults. An invitation was extended to all attendees, and those who agreed to participate became part of the sample. Inclusion criteria were that participants be over 60 years old, not diagnosed with psychiatric illness, and not have visual or motor defects that would prevent them from completing the cognitive evaluation activities.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

The sample consisted of 120 individuals, with ages ranging from a minimum of 60 years to a maximum of 88 years, and an average age of 70.49 years (SD = 7.52). Of the total number of interviewees, 65.6% were women, and 34.4% were men.

2.2. Data Collection Instruments

The following instruments were used for data collection:

- Ad Hoc Questionnaire: Used to collect sociodemographic information such as age, gender, and level of education.
- MoCA Test (Montreal Cognitive Assessment): A brief 30-item test that helps assess mild cognitive dysfunction. It was published in 2005 by a group from McGill University. It includes the evaluation of: Orientation, Memory, Visuospatial Ability, Language Skills, Abstraction, Animal Naming, Attention, and Clock Drawing Test (Nasrredine, 2017).

The test has been validated in Argentina by two teams. González Palau et al. (2018) aimed to determine the validity of the instrument in differentiating healthy individuals from those with mild cognitive impairment. They used a sample of 115 control subjects and 154 subjects with impairment and concluded that the cutoff score of 26 (proposed by the creator of the technique) is adequate to differentiate the two groups. They reported that the instrument has good sensitivity (0.727) and specificity (0.748) (González Palau et al., 2018). In a second validation study with 399 older adults (divided into healthy, cognitively impaired, and demented groups), they found the instrument had good stability using the test-retest technique and appropriate internal consistency ($\alpha = 0.886$) using Cronbach's Alpha (Serrano et al., 2020).

- WHOQOL Test: With 26 items answered on a Likert scale, it provides a profile of the quality of life as perceived by the individual, identifying four dimensions: physical, psychological, social, and environmental. Espinoza et al. (2011) conducted reliability (using Cronbach's Alpha) and validity (using confirmatory factor analysis) tests with a sample of 1520 older adults, obtaining acceptable results in both techniques. Based on the scores obtained from this population, scales were developed to classify the scores in each dimension as low, medium, and high.
- ViDA Questionnaire (Daily Life of Older Adults): Used to assess the functional status of individuals through 10 questions related to instrumental activities of daily life. Each item is answered independently on a scale ranging from complete autonomy in performing the task to the inability to perform it. This technique was validated in Buenos Aires (Argentina) with a sample of older adults, showing good internal consistency evaluated with Cronbach's Alpha ($\alpha = 0.91$). To assess validity, the results of the questionnaire were compared with the scores of the Lawton Brody Scale, finding a high correlation of 0.91 ($p < 0.05$) (Soler-König et al., 2016).

2.3. Procedure

Participants who agreed to participate were contacted by phone, and a meeting was arranged at their home. The instrument was administered individually in all cases. Efforts were made to ensure no other individuals were present and that distractions (such as turning off televisions or radios) were minimized. Before starting the interview, the participant was informed about the activities that would take place, the purpose of the study, the voluntary nature of their participation, and the confidentiality of the data concerning their identity. They were then asked to read and sign an informed consent form explaining the aforementioned points.

2.4. Data Analysis

Data analysis was conducted using the IBM SPSS 21 statistical package. Descriptive calculations of frequency analysis and contingency tables were performed to describe the variables under study. To meet the main research objective, the chi-square test was used to verify the relationship between variables, and the Mann-Whitney U test was used to compare groups. Finally, for statistically significant comparisons, Cohen's D was used to calculate the effect size.

Results

3.1. Descriptive Statistics

The first variable analyzed was the education level. Three groups were formed: the first group consisted of individuals with complete or lower primary education. This group included 44 individuals, representing 36.7% of the sample. The second group included individuals with incomplete or complete secondary education, totaling 38 individuals, representing 31.7%. Finally, individuals with higher education, either complete or incomplete, formed the third group, which also had 38 individuals.

Cognitive functioning, assessed using the MoCA test, predominantly showed low scores. 60% of the evaluated individuals scored below the cut-off point proposed by the technique to determine normal cognitive functioning. When analyzing these results using a contingency table, it was observed that the majority of individuals who scored below the cut-off point belonged to the primary education group. On the other hand, most individuals with normal cognitive functioning belonged to the higher education group. Additionally, using the chi-square test, it was confirmed that there is a dependency between the variables (p=0.000) (*Table 1*).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Table 2

Contingency Table: Education Level and Quality of Life Dimensions.

			MoCA Score		Pearson Chi-Square	Asymptotic Significance (Bilateral)
			<26	≥26		
Education Level	Primary	Count	38	6	25,602	,000
		% of total	31,7%	5,0%		
	Secondary	Count	22	16		
		% of total	18,3%	13,3%		
	Higher	Count	12	26		
		% of total	10,0%	21,7%		

The questionnaire used to measure quality of life yielded individual scores for each domain of quality of life. Regarding the physical domain, it was found that 16.7% of the sample had a low score, 51.7% had a medium score, and 31.7% had a high score. As in the previous case, the highest percentage of individuals with low scores belonged to the primary education group, and the largest percentage of individuals with high physical quality of life scores belonged to the higher education group. The chi-square test confirms the relationship between both variables (p=0.000) (*Table 2*).

In the psychological dimension, it was found that 15.8% of the participants had low scores, 56.7% had medium scores, and 27.5% had high scores. Similar percentages were found in the social dimension, where 16% had a low score, 58% had a high score, and the remaining 26% had high scores. In the environmental dimension, it was observed that the majority of the sample, 61.7%, had high scores, followed by 32.5% with medium scores, and finally, only 5.8% had low scores. The chi-square test indicated that there were no statistically significant relationships between the scores of these three dimensions and the participants' education level.

Table 2

Contingencia Escolaridad y Dimensiones de la Calidad de Vida.

			Physical Dimension			Pearson Chi-Square	Asymptotic Significance (Bilateral)
			Low	Medium	High		
Education Level	Primary	Count	10	30	4	20,272	,000
		% of total	8,3%	25,0%	3,3%		
	Secondary	Count	6	19	13		
		% of total	5,0%	15,8%	10,8%		
	Higher	Count	4	13	21		
		% of total	3,3%	10,8%	17,5%		
			Psychological Dimension				
			Low	Medium	High		
Education Level	Primary	Count	8	27	9	2,723	,605
		% of total	6,7%	22,5%	7,5%		
	Secondary	Count	7	19	12		
		% of total	5,8%	15,8%	10,0%		
	Higher	Count	4	22	12		
		% of total	3,3%	18,3%	10,0%		
			Psychological Dimension				
			Low	Medium	High		
Education Level	Primary	Count	7	30	6	6,750[a]	,150
		% of total	5,9%	25,2%	5,0%		
	Secondary	Count	7	17	14		
		% of total	5,9%	14,3%	11,8%		
	Higher	Count	5	22	11		
		% of total	4,2%	18,5%	9,2%		
			Psychological Dimension				
			Low	Medium	High		
Education Level	Primary	Count	3	13	28	5,973	,201
		% of total	2,5%	10,8%	23,3%		
	Secondary	Count	3	17	18		
		% of total	2,5%	14,2%	15,0%		
	Higher	Count	1	9	28		
		% of total	0,8%	7,5%	23,3%		

Functional capacity, assessed using the ViDA questionnaire, could be classified according to the person's level of independence or dependence. It was found that 14.3% of the sample exhibited mild dependence, while 85.7% exhibited total independence. No cases of moderate, severe, or total dependence were recorded. Using the chi-square test, it was confirmed that there is a relationship of dependence between functional capacity and education level (p=0.001). In *Table 3*, it was observed that the highest percentage of independent individuals belonged to the group with higher

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

education, while the largest number of individuals with mild dependence belonged to the group with primary education.

Table 3

Contingency Table: Education Level and ViDA Questionnaire Score

			ViDA Score		Pearson Chi-Square	Asymptotic Significance (Bilateral)
			Independence	Mild Dependency		
Education Level	Primary	Count	13	31	13,945	,001
		% of total	10,8%	25,8%		
	Secondary	Count	3	35		
		% of total	2,5%	29,2%		
	Higher	Count	1	37		
		% of total	0,8%	30,8%		

3.2. Group Comparisons

In order to pinpoint which groups showed these differences, comparisons were made between the three groups formed based on education level. The variables to be compared were those that showed a dependency relationship with education level in the chi-square test.

First, the MoCA test score, physical quality of life, and ViDA questionnaire score were compared between the group of older adults with primary education and the group of older adults with secondary education. Significant differences were found in the MoCA test scores (p=0.000), with a large effect size, calculated using Cohen's d (d=0.97), and in the ViDA questionnaire scores (p=0.010), with a medium effect size (d=0.64). In both cases, the group with higher scores was the one with secondary education.

A comparison was made between individuals with secondary and higher education. In this case, no significant difference was found regarding physical quality of life (p=0.067) or functional capacity (p=0.392). However, a significant difference was found in the MoCA test score (p=0.028), with a small effect size (d=0.45), with the higher education group presenting better scores.

Finally, the group with primary education was compared with the group with higher education. In this case, significant differences were found in the physical quality of life variable (p=0.000), with a large effect size (d=0.92), in the ViDA questionnaire scores (p=0.001), also with a large effect size (d=0.95), and in the MoCA test scores (p=0.000), again with a large effect size (d=1.41). In all cases, the differences favored the group with higher education.

Conclusions

The results found in this research supported the importance of education in certain aspects of the healthy aging process of older adults. This was primarily reinforced by the relationship between educational level and the cognitive and functional abilities of older people.

This research confirmed that there is a dependency relationship between the cognitive ability of older adults and their level of education. Significant differences were found between the group with primary education and the group with secondary education, and between the latter and the group with higher education. This result aligned with previous studies that proposed educational level as a protective factor against cognitive decline (León Samaniego and León Tumbaco, 2018; Vite and Calderón, 2018).

Moreover, these results supported the cognitive reserve theory. Older adults who had completed more years of study had more resources to solve tasks in the neurocognitive assessment test. The skills acquired during their education affected their cognitive abilities in later adulthood. Additionally, a relationship was also found between functional ability and educational level. Functional ability is a key variable for healthy aging. The fact that older adults can maintain their independence during this stage of life has been one of the most important global goals. The World Health Organization (2015) emphasized this aspect in its concept of healthy aging.

This study found that there is a relationship between instrumental activities of daily living and the educational level of older adults, confirming previous research findings (Luna and Varga, 2018). However, it is necessary to highlight that, while there is a difference between older adults with primary education and the other groups, no differences were found between the secondary and higher education groups. This is significant, as it could imply that the development of the skills necessary for independent functioning in daily life may occur during primary education.

This point was emphasized not with the intention of prioritizing one level of education over another, but to reconsider the objectives and structure of the education system. As observed in the results of this study, the aging process begins to be structured and defined from early stages of life. It is necessary for preparation for this stage to be part of the comprehensive education of individuals. Just as formal education prepares children and adolescents for the responsibilities and tasks of adulthood, it is necessary to start highlighting the importance of developing the capacities and skills needed to navigate old age healthily.

On the other hand, self-perceived quality of life is also a key variable in older adulthood. In the concept of healthy aging by the World Health Organization, the importance of maintaining functional ability to be and do what the person desires is emphasized (World Health Organization, 2015). This concept is closely related to subjective or self-perceived quality of life, because each individual's values and personal goals determine the assessment and evaluation of different life domains. Self-perceived quality of life does not refer to living conditions, but to the extent to which these conditions align with the needs, interests, values, and goals of each person.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

It should be noted that, of the four dimensions of quality of life, only the physical dimension showed a relationship with educational level. In this case, the group with higher education showed significant differences compared to the other groups, but no differences were found between the primary and secondary education groups. These results are consistent with those obtained by Cardona et al. (2016), who also found a statistically significant relationship between educational level and the physical dimension of quality of life in a sample of older adults.

The relationship between both variables has been explained from two different perspectives. First, it has been suggested that access to a higher level of education leads to greater knowledge that facilitates access to healthcare services. The second, better-supported proposal highlights the link between the educational level of older adults and their socioeconomic status (López et al., 2019).

Older adults who were able to access secondary and higher education generally had a more advantageous economic position. Additionally, access to such education also implied access to better-paying jobs with healthcare coverage, which may explain the better perception of physical quality of life.

This relationship between socioeconomic status and educational level is a reality that should not be ignored and leads to the need to interpret the relationship between educational level and other variables with caution. It is necessary to consider social determinants in their intersectionality, understanding that variables such as gender, ethnicity, age, and socioeconomic position intersect in complex power networks. This research acknowledges the fact that not considering these variables as a limitation. Similarly, the inability to perform parametric statistics due to the abnormal distribution of variables should be noted. Future research should address these limitations to build more robust evidence.

Finally, it is important to emphasize that, while the remaining dimensions of quality of life are not related to formal educational level, they can be enhanced through informal educational spaces. The perception of the social environment and psychological functioning can be improved by participating in various non-formal education spaces for older adults. There is evidence supporting that participation in educational projects, social interaction, emotional regulation, and/or physical activity is related to improved quality of life in older adults (Mesa et al., 2020).

While formal education is a valuable resource for healthy aging, the quality of life of older adults will be shaped by present experiences. Non-formal education offers older adults new participation spaces to redefine their present, which will affect how they value and assess their reality. Therefore, at this age, it is essential to create new participation spaces and strengthen those already existing to improve the subjective perception older adults have of their aging process.

References

Cardona, J., Giraldo, E., y Maya, M. A. (2016). Factores asociados con la calidad de vida relacionada con la salud en adultos mayores de un municipio colombiano, 2013. *Médicas UIS*, *29*(1), 17-27. https://doi.org/10.18273/revmed.v29n1-2016002

Cortés, C., Cardona, D., Segura, Á., y Garzón, M. (2016). Factores físicos y mentales asociados con la capacidad funcional del adulto mayor, Antioquia, Colombia, 2012. *Revista de Salud Pública*, *18*(2), 167-178. https://doi.org/10.15446/rsap.v18n2.49237

Espinoza, I., Osorio, P., Torrejón, M., Lucas, R., y Bunout, D. (2011). Validación del cuestionario de calidad de vida (WHOQOL-BREF) en adultos mayores chilenos. *Revista médica de Chile*, *139*(5), 579-586. https://doi.org/10.4067/S0034-98872011000500003

Feldberg, C., Stefani, D., Tartaglini, M., Hermida, P., Moya, L., Somale, M., y Allegri, R. (2020). La influencia de la educación y la complejidad laboral en el desempeño cognitivo de adultos mayores con deterioro cognitivo leve. *Ciencias Psicológicas*, *14*(1). https://doi.org/22235/cp.v14i1.2194

González Celis, A. y Araujo, A. (2010). Estrategias de afrontamiento ante la muerte y calidad de vida en adultos mayores mexicanos. *Revista Kairós Gerontologia*, *13*(1), 167-190. https://pesquisa.bvsalud.org/portal/resource/pt/lil-638344

González Palau, F., Berrios, W., García, M., Ojea, M., Fernández, M., García, M., Fernández, M., Cámpora, N., Matusevich, L., y Golimstok, Á. (2018). Validez de la prueba de Evaluación Cognitiva de Montreal (MoCA) como una herramienta de screening para detectar Deterioro Cognitivo Leve en población de Buenos Aires, Argentina. *VERTEX*, *39*(140), 252-260. https://revistavertex.com.ar/ojs/index.php/vertex/article/view/300

Hernández, R. y Mendoza, C. (2018). *Metodología de la Investigación: Las rutas cuantitativa, cualitativa y mixta*. Mc Graw Hill.

Jiménez, P. (2020). La educación como derecho social, humano y fundamental: Principios y perspectivas de la educación moderna. *Revista de Investigações Constitucionais*, *6*(3), 669-686. https://doi.org/10.5380/rinc.v6i3.58017

León Samaniego, G. y León Tumbaco, E. (2018). Factores asociados al deterioro cognitivo en adultos mayores de la parroquia El Salto – Babahoyo (Ecuador). *Cumbres*, *4*(1), 75-87. https://dialnet.unirioja.es/servlet/articulo?codigo=6550770

López, M., Quesada, J., y López Catalán, Ó. (2019). Calidad de vida relacionada con la salud y determinantes sociodemográficos en adultos de Cuenca, Ecuador. *Revista Economía y Política*, (29), 67-86. https://dialnet.unirioja.es/servlet/articulo?codigo=6766830

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Luna, Y. y Vargas, H. (2018). Factores asociados con el deterioro cognoscitivo y funcional sospechoso de demencia en el adulto mayor en Lima Metropolitana y Callao. *Revista de Neuro-Psiquiatría*, *81*(1), 9-19. https://doi.org/10.20453/rnp.v81i1.3269

Marquez, A. (2022). Sobre la definición de la calidad de vida subjetiva. *PsicoPedagógica*, *13*(17), 173-189. https://www.cicuyo.org/ojs/index.php/Psicoped/article/view/141

Mesa, D., Valdés, B., Espinosa, Y., Verona, A., y García, I. (2020). Estrategia de intervención para mejorar la calidad de vida del adulto mayor. *Revista Cubana de Medicina General Integral*, *36*(4). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21252020000400010

Nasrredine, Z. (2017). Montreal Cognitive Assessment Versión 8.1. *MoCA Test*. https://www.mocatest.org/paper/

Organización Mundial de la Salud. (2015). Informe Mundial sobre el envejecimiento y la salud. *WHO*. https://www.who.int/es/publications/i/item/9789241565042

Santi, F. (2019). Educación: La importancia del desarrollo infantil y la educación inicial en un país en el cual no son obligatorios. *Revista Ciencia Unemi*, *12*(30), 143-159. https://dialnet.unirioja.es/servlet/articulo?codigo=7067116

Satorres, E. (2013). *Bienestar psicológico en la vejez y su relación con la capacidad funcional y la satisfacción vital* [Tesis doctoral, Universitat de València]. Repositorio Institucional. https://dialnet.unirioja.es/servlet/tesis?codigo=78491

Serrano, C., Sorbara, M., Minond, A., Finlay, J., Arizaga, R., Iturry, M., Martinez, P., Heinemann, G., Gagliardi, C., Serra, A., Magliano, F., Yacovino, D., Rojas, M., Ruiz, A., y Graviotto, H. (2020). Validation of the Argentine version of the Montreal Cognitive Assessment Test (MOCA): A screening tool for Mild Cognitive Impairment and Mild Dementia in Elderly. *Dementia & Neuropsychologia*, *14*(2), 145-152. https://doi.org/10.1590/1980-57642020dn14-020007

Tenorio, J., Romero, Z., Roncal, V., y Cuba, M. (2021). Calidad de vida de adultos mayores de la Seguridad Social peruana durante la pandemia por COVID-19. *Revista del Cuerpo Médico Hospital Nacional Almanzor Aguinaga Asenjo*, *14*, 42-48. https://doi.org/10.35434/rcmhnaaa.2021.14sup1.1165

Villa, M. (2017). Envejecimiento cognitivo vs. Deterioro cognitivo leve. En M. Á. Villa-Rodríguez, M. E. Navarro Calvillo y T. de J. Villaseñor Cabrera, *Neuropsicología Clínica Hospitalaria* (pp. 263-282). Manual Moderno. https://www.ncbi.nlm.nih.gov/nlmcatalog/101698435

Vite, J. y Orozco, G. (2018). Funcionamiento Cognitivo, Actividades de la Vida Diaria y Variables Demográficas en Adultos Mayores Mexicanos. *Revista Neuropsicología, Neuropsiquiatría y Neurociencias*, *18*(3), 65-84. http://revistaneurociencias.com/index.php/RNNN/article/view/112

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1232 • e-ISSN: 2631 - 2786

Scientific production in Scopus on research skills in university students. A systematic review

Producción científica en Scopus sobre competencias investigativas en estudiantes universitarios. Una revisión sistemática

Date of receipt: 2024-02-25 • Date of acceptance: 2024-09-11 • Date of publication: 2025-01-10

Pablo César Torres Cañizalez [1]
Universidad César Vallejo, Perú
ptorresc@ucv.edu.pe
https://orcid.org/0000-0001-9570-4526

John Kendry Cobo Beltrán [2]
Universidad César Vallejo, Perú
johnkcobo@gmail.com
https://orcid.org/0000-0003-0997-3821

Mónica Liliana Agüero-Ynca [3]
Universidad César Vallejo, Perú
magueroy@ucv.edu.pe
https://orcid.org/0000-0001-6786-5701

Beatriz García-Bravo [4]
Universidad César Vallejo, Perú
bgarciab@ucv.edu.pe
https://orcid.org/0000-0002-4644-9423

Abstract

Interest in the research skills of university students has experienced a notable increase, reflected in the growth of scientific publications, which have great methodological diversity and are developed in various training contexts, which is why a panoramic view of these publications becomes imperative. Therefore, this study aims to characterize the scientific production in Scopus on research competencies in university students. For these purposes, the PRISMA Declaration was followed. Using Boolean descriptors and operators, a literature search was carried out that allowed 690 documents to be identified and after applying inclusion and exclusion criteria, 25 scientific articles were chosen for the study. As results of the review, it is highlighted that 72% of the articles correspond to the quantitative approach, 56% were written in English, 44% were carried out in Peru and the majority of the studies, the research competencies are addressed from the self-perception of the student. In conclusion, the works studied show various levels of achievement of investigative skills and constitute valuable inputs for carrying out new and necessary research.

Keywords: Higher education, research competencies, research skills, university students, systematic literature review

Resumen

El interés en las competencias investigativas del estudiantado universitario ha experimentado un notorio aumento, reflejado en el crecimiento de publicaciones científicas, las cuales tienen una gran diversidad metodológica y se desarrollan en variados contextos formativos; por esta razón, se vuelve imperativo una mirada panorámica de estas publicaciones. Este estudio tuvo como finalidad caracterizar la producción científica en Scopus sobre competencias investigativas en estudiantes universitarios. Para estos fines, se siguió la Declaración PRISMA. A partir de descriptores y operadores booleanos se realizó una búsqueda de literatura que permitió identificar 690 documentos y luego de la aplicación de criterios de inclusión y exclusión se eligieron 25 artículos científicos para el estudio. Como resultados de la revisión se destacó que el 72% de los artículos corresponden al enfoque cuantitativo, un 56% fueron escritos en inglés, el 44% se realizaron en el Perú y en la mayoría de los estudios las competencias investigativas se abordaron desde la autopercepción del estudiante. En conclusión, los trabajos estudiados mostraron diversos niveles de logro de las competencias investigativas y constituyeron valiosos insumos para la realización de nuevas y necesarias investigaciones.

Palabras clave : educación superior, competencias investigativas, habilidades investigativas, estudiantes universitarios, revisión sistemática de literatura

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

Currently, the research competencies of university students are fundamental to their academic and professional development. These competencies allow students to develop critical, creative, and reflective skills necessary to address complex problems and generate new knowledge. In a knowledge-based society, universities play a crucial role in training professionals capable of researching and applying innovative solutions in their fields. Therefore, the development of research competencies is essential not only for students' academic success but also for their ability to contribute significantly to society and the global labor market.

The research competencies of university students have been the subject of study and debate worldwide because, in a knowledge society, science and technology play a special role in the development of nations and in the productivity of organizations. From this perspective, universities are expected to generate scientific and technological knowledge through scientific research while also training professionals prepared to act with scientific judgment in their respective fields (Guerra et al., 2023; Gussen et al., 2023; Campos et al., 2022). In this context, society demands professionals who perform creatively, critically, reflectively, and systematically to positively impact and transform reality from its complexity and dynamism. To achieve this, universities must strengthen the development of so-called research competencies in their academic programs.

In this sense, the term competency is polysemous. In the educational field, it refers to the individual capacity that enables a subject to act with the necessary skill and expertise to meet a specific demand. Research competency refers to a set of essential knowledge, attitudes, and behaviors required to carry out successful research (García and Aznar, 2019; Knyazyan and Mushynska, 2019; Wessels et al., 2018). There are various classifications of research competencies. For example, Zarraga and Cerpa (2023) distinguish between basic research competencies related to the systematization of data and information generated from the formulation of a research project, and advanced research competencies, which involve processes of linking theory with practice from a holistic and ethical perspective, with commitment and social responsibility. Sánchez and Rodríguez (2023) refer to competencies for problematizing reality through the observation of events or phenomena and their subsequent study; competencies for theorizing reality, aimed at testing existing theories or constructing new theories based on reliable sources; and competencies for verifying reality, by contrasting the problematic reality with previously existing theories.

Research competencies have cognitive, metacognitive, motivational, and personal components that make it possible to carry out each stage of the scientific research process, including skills such as teamwork, the use of technologies in research, and good interpersonal relationships (Rubio et al., 2018). These competencies involve a set of intellectual processes where perception, comprehension, and interpretation are particularly important, without neglecting practice, which is inevitably connected to theory (Infante, 2021). Research competencies energize the scientist's mindset as they are expressed in capabilities such as the efficient and optimal management of scientific literature, identifying and addressing research problems, designing the methodology, selecting techniques and instruments, testing hypotheses, and communicating research results.

Indeed, research competencies are implicit in the generic competencies agreed upon in the Tuning Project and are highly valued in higher education today. However, weaknesses have been identified in universities regarding the development of these competencies in both undergraduate and graduate education (Zarraga and Cerpa, 2023). As an attempt to address the issue, teaching initiatives such as formative research, research seedbeds, methodological coaching, and teaching-learning of research through interactive technological tools, gamification, and even the use of social networks have emerged. These initiatives for teaching and learning research competencies are carried out from various paradigms, theories, approaches, and models of educational thinking, in synergy with the worldviews of the context.

This growing interest in research competencies is reflected in the increase of scientific publications on this topic in the university setting, written from multiple methodological perspectives and various training contexts. Therefore, it is useful and necessary to have a panoramic view of the main publications in Scopus, a platform that is the largest database with a vast number of journals, and whose relevance is indisputable in the academic field. For this reason, the study aimed to characterize the scientific production in Scopus on research competencies in university students.

Methodology

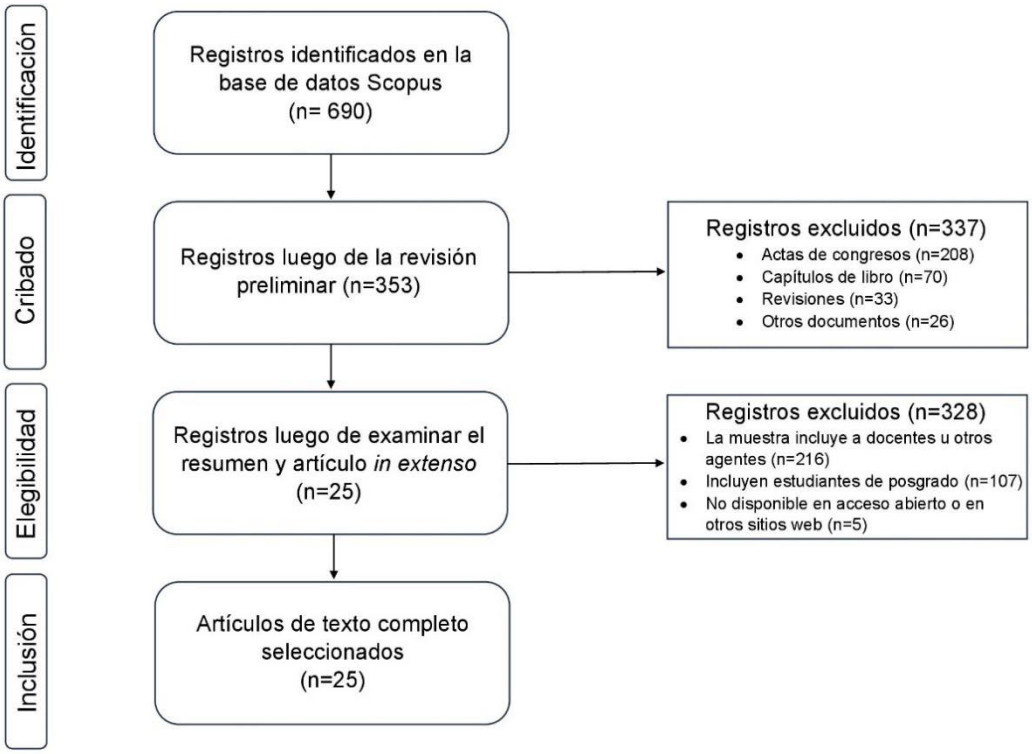
This study started with the research question: What are the most significant characteristics of the scientific production published in Scopus regarding research competences in university students between 2023 and 2019?

To answer this question, a systematic literature review was carried out, following the protocol outlined in the PRISMA Declaration [The Preferred Reporting Items for Systematic Reviews and Meta-Analysis] (Moher et al., 2015), which constitutes a strategy for the collection, review, and systematic analysis of scientific literature used when there is a need to study and organize the findings of research on a specific topic in a synthetic manner to ensure its systematicity, quality, and replicability. Additionally, a four-phase framework for systematic literature review was used, which for the purposes of this study is presented below in *Figure 1*.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 1

Phases of the Systematic Literature Review.



Regarding the Identification stage, the literature search in the Scopus database was carried out in January 2024. The descriptors or terms used were: “Research competences,” “Competence for research,” “Competence towards research,” “Investigative capacities,” “Capacities for research,” “Investigative skills,” “Research skills.” These terms were combined with Boolean operators (OR, AND) and terms that directed the search toward studies conducted on university students: “University Student,” “College Student,” “University,” “College.” Following successive searches by each author separately, and after eliminating duplicate works, a total of 690 documents were obtained.

During the Screening stage, the title and summary of the 690 identified records were examined, excluding documents that were not articles published in journals, such as book chapters, reviews, conference proceedings, and others. In this stage, 337 records were excluded, leaving 353 eligible articles. The selection of articles in this study was made based on pre-established inclusion and exclusion criteria, which are detailed in *Table 1*.

Regarding the Identification stage, the literature search in the Scopus database was conducted during January 2024. The following descriptors or terms were used: “Research competences,” “Competence for research,” “Competence towards research,” “Investigative capacities,” “Capacities for research,” “Investigative skills,” and “Research skills.” These terms or descriptors were combined

using Boolean operators (OR, AND) and with terms that directed the search toward studies conducted on university students: "University Student," "College Student," "University," and "College." Through successive searches conducted separately by each author and after eliminating duplicate records, a total of 690 documents were obtained.

During the Screening stage, the titles and abstracts of the 690 identified records were reviewed, excluding documents that were not journal articles, such as book chapters, reviews, conference proceedings, and others. In this stage, 337 records were excluded, leaving 353 eligible articles. The selection of articles in this study was carried out based on predefined inclusion and exclusion criteria, which are detailed in *Table 1*.

Table 1

Inclusion and Exclusion Criteria.

Criterion	Inclusion	Exclusion
Educational Level	Studies conducted in the context of higher education	Estudios realizados en el contexto de la educación inicial, primaria, secundaria o técnica
Article Focus	That includes research competences in university students as one of its variables or study categories	That does not include research competences in university students as one of its variables or study categories
Type of Publication	Original research articles	Capítulos de libro, revisiones, actas de congresos, notas
Study Units	University students	University teachers and researchers, other agents.

In the Eligibility stage, the abstract and full text of the 353 records were reviewed preliminarily to verify that the studies were conducted in the context of higher education, that they included research competences as one of their variables or study categories, and that the study unit or subjects were university students. Five of the works were not available in full text, nor could they be obtained from other websites, so they had to be discarded. In this stage, 328 records were excluded, and 25 articles were selected, which were independently reviewed by each author to minimize the potential for bias.

For the Inclusion stage, the full text of the 25 articles was reviewed and then consolidated into a database created in Excel, considering the following attributes: manuscript title, author(s), journal name, quartile, country of publication, country of the study, publication language, research focus and design, sample size, educational setting, and findings regarding research competences.

Results

The results and discussion of this systematic literature review were presented in two sections. The first section focused on the bibliometric and methodological traits of the scientific production in Scopus regarding research competencies in university education. In the second section, the findings of the reviewed articles were analyzed.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

3.1. Bibliometric and Methodological Traits of the Scientific Production Published in Scopus

The list of the 25 articles included in the systematic literature review, containing the code, citation, country where the study was conducted, research approach, and article language, is presented in *Table 2*.

Table 2

List of Articles Included in the Systematic Literature Review.

Code	Citation	Country of Study	Language	Approach
1	Zarraga-Barreno et al. (2023)	Chile	Spanish	Qualitative
2	Ipanaqué-Zapata et al. (2023)	Peru	English	Quantitative
3	Guerra et al. (2023)	Peru	English	Quantitative
4	Gussen et al. (2023)	Germany	English	Quantitative
5	Enriquez et al. (2023)	Peru	English	Quantitative
6	Romaniuk et al. (2023)	Ukraine	English	Quantitative
7	Sánchez and Rodríguez (2023)	Peru	Spanish	Qualitative
8	Campos-Ugaz et al. (2022)	Peru	English	Quantitative
9	Ciraso-Calí et al. (2022)	Spain	English	Quantitative
10	Estrada et al. (2022)	Cuba	Spanish	Qualitative
11	Zapata (2022)	Peru	Spanish	Quantitative
12	Chávez et al. (2022)	Peru	Spanish	Qualitative
13	Díaz and Cardoza (2021)	Peru	Spanish	Quantitative
14	Garay-Argandona et al. (2021)	Peru	English	Quantitative
15	Vera-Rivero et al. (2021)	Cuba	Spanish	Quantitative
16	Rodríguez-Vargas et al. (2020)	Peru	English	Quantitative
17	Prosekov et al. (2020)	Russia	English	Mixed
18	Galustyan et al. (2020)	Russia	English	Quantitative
19	Sokolova and Gilmutdinova (2019)	Russia	English	Quantitative
20	García-Gutiérrez and Aznar-Díaz (2019)	Colombia	Spanish	Mixed
21	Bucheli et al. (2019)	Argentina and others	Spanish	Quantitative
22	Cardoso and Cerecedo (2019)	Mexico	Spanish	Quantitative
23	Knyazyan and Mushynska (2019)	Ukraine	English	Mixed
24	Alfaro-Mendives and Estrada-Cuzcano (2019)	Peru	Spanish	Quantitative
25	Poh and Kanesan (2019)	Malaysia	English	Quantitative

Regarding the publication dates of the included studies, seven were published in 2023 (28%), five in 2022 (20%), three in 2021 (12%), three in 2020 (12%), and seven in 2019 (28%). There is a clear increase in publications in 2023 and a decline during the COVID-19 pandemic, a period when university academic activities were forced to transition to virtual formats due to health regulations.

Eleven of the studies that met the inclusion and exclusion criteria were conducted in Peru (44%), three in Russia (12%), two in Ukraine (8%), two in Cuba (8%), one in Spain, Chile, Germany, Colombia, Mexico, and Malaysia. Notably, the work by Bucheli et al. (2019) was carried out in Argentina, Colombia, Cuba, Spain, Mexico, Peru, Puerto Rico, Uruguay, Venezuela, Chile, Nicaragua, Panama, El Salvador, Ecuador, Costa Rica, Bolivia, and Paraguay.

It is important to mention the significant number of studies conducted in Peru on research competencies in university students. This can be attributed to the accreditation and licensing processes promoted by the Ministry of Education of Peru, which has fostered growing interest among universities and academic staff to consolidate a research system that meets international standards. It is also notable that many studies have been carried out in developing countries, which could be seen as an indicator of the importance being placed on research as a driver of science and technology in these nations.

Regarding the original language of the reviewed articles, fourteen were published in English (56%), while eleven were in Spanish (44%), which is a significant percentage, considering that the majority of mainstream literature is published in English. Seventy-two percent of the studies included in this review were published in journals ranked in Q2 and Q3 quartiles, two studies were published in Q4 journals (8%), one study in a Q1 source, and four studies, while indexed in Scopus, were published in journals without an assigned quartile.

The studies included in this systematic literature review on research competencies in university students were predominantly quantitative (72%), with only four studies adopting a qualitative approach (16%) and three employing a mixed research approach (12%). This shows a preference for quantitative studies aimed at exploring the relationship or degree of association between two or more variables or phenomena in a given context (Hernández and Torres, 2018).

Among the studies using a quantitative approach, there was diversity in the research designs. Ipanaqué et al. (2023), Romaniuk et al. (2023), Campos et al. (2022), and Galustyan et al. (2020) used experimental designs, particularly excelling in the controlled evaluation of variables. Gussen et al. (2023) and Rodríguez et al. (2020) opted for quasi-experimental designs, with the latter being longitudinal and prospective, offering a more dynamic understanding over time. Zapata (2022) and Alfaro and Estrada (2019) used pre-experimental designs focused on the preliminary evaluation of effects. In the non-experimental domain, Enriquez et al. (2023) and Poh and Kanesan (2019) conducted correlational studies to explore associations between variables. Other studies, such as those by Mamytbayeva et al. (2022), Ciraso et al. (2022), Prosekov et al. (2020), and Knyazyan and Mushynska (2019), employed descriptive approaches, while Bucheli et al. (2019) conducted a cross-sectional, descriptive study, and Cardoso and Cerecedo (2019) used an exploratory-descriptive approach. Díaz and Cardoza (2021) and Vera et al. (2021) used descriptive observational designs, providing detailed data on the studied variables.

For the collection of quantitative data, the most commonly used instrument was the questionnaire (48%), followed by scales (20%), and less commonly checklists and rubrics. Some examples of the measurement instruments used include: Investigative Skills Scale (Ipanaqué et al., 2023), Research Skills Assessment Questionnaire (Guerra et al., 2023), Socio-formative Rubric for Assessing

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Research Competencies (Campos et al., 2022), Böttcher and Thiel's Questionnaire (Ciraso et al., 2022), Self-assessment of Research Skills Scale (Díaz and Cardoza, 2021), Research Competency Questionnaire (Garay et al., 2021), and Research Skills Measurement Questionnaire (Rodríguez et al., 2020).

These quantitative studies incorporated a wide variety of data analysis procedures, with the common denominator being the use of tests to determine the reliability of the instruments. One or more statistical tests were used, including descriptive statistics, exploratory factor analysis, and, to a lesser extent, other inferential tests such as Pearson's Chi-square, ANOVA, Student's t-test, Wilcoxon test, among others.

On the other hand, although less numerous, the qualitative studies provided deep and contextual approaches. Zarraga and Cerpa (2023) used a phenomenological design to explore the lived experiences of participants, allowing for a rich and detailed understanding of the perceptions and meanings attributed. Likewise, Sánchez and Rodríguez (2023) and Chávez et al. (2022) adopted the action-research methodology, a strategy that allows researchers and participants to collaborate actively in the research process to address practical issues and improve practices. Furthermore, Estrada et al. (2022) implemented a case study, providing a comprehensive understanding of a specific phenomenon within its real context, which is invaluable for deepening knowledge in particular situations.

Regarding the studies with a mixed approach, these combined qualitative and quantitative methodologies to provide a more comprehensive view of the research competencies in university students. Guerra et al. (2023) integrated a qualitative descriptive analysis with a quasi-experimental design, allowing both detailed description of relationships between variables and controlled experimentation to validate the findings. Similarly, García and Aznar (2019) employed a design that integrates qualitative and quantitative data, providing a holistic perspective and a triangulation of data that strengthens the validity and reliability of the results obtained. This combination of methodological approaches allows research competencies to be addressed from multiple perspectives, enriching the understanding and providing a more robust and complete analysis.

Regarding the sample sizes considered in each study on research competencies in university students, whether qualitative, quantitative, or mixed, ten studies have configured samples ranging between 50 and 149 students (40%), seven studies have samples between 150 and 999 students, five studies have samples of fewer than 49 students (20%), and three studies were conducted with samples of more than 1,000 students. This indicates that, in the majority, researchers sought results that were more generalizable and credible.

3.2. Findings in the Scientific Production Published in Scopus

The analysis of findings from the scientific productions indexed in Scopus in this systematic review had as its starting point the necessary clarification of the terminology underlying each work regarding research competencies, since some used the term "research competencies" and other groups of authors used "research skills."

Regarding the term "research competencies," it is used by Zarraga and Cerpa (2023), Gussen et al. (2023), Enriquez et al. (2023), Sánchez and Rodríguez (2023), Campos et al. (2022), Zapata (2022), Chávez et al. (2022), Garay et al. (2021), Prosekov et al. (2020), Galustyan et al. (2020), García and Aznar (2019), Bucheli et al. (2019), Cardoso and Cerecedo (2019), Knyazyan and Mushynska (2019). The term "competence" comes from the Latin competens, which means "to be capable of," and in the educational field, it refers to complex abilities that allow students to think and act in various areas. Research competencies, then, are comprehensive actions that enable the identification, interpretation, argumentation, and resolution of problems within a given context in an appropriate and ethical manner, considering the "know-how, know-do, and know-know" (Tobón et al., 2010). In studies that used the term "research competencies," this conception is essentially underlying.

Considering the reviewed studies, research competencies are capabilities that enable an individual to employ scientific knowledge to identify problems, acquire new knowledge, explain scientific phenomena, and draw conclusions (Chávez et al., 2022). They are oriented to identify, formulate, question, plan, develop, lead, execute, and report the results of a research project (Garay et al., 2021). They include analytical, forecasting, reflective, and communicative skills for the development of research (Campos et al., 2022; Knyazyan and Mushynska, 2019), involving cognitive components, metacognitive elements, motivation, and social and professional experience of the individual (Cardoso and Cerecedo, 2019), as well as processes like critical thinking and ethical reasoning (Gussen et al., 2023; Galustyan et al., 2020), and personal qualities (Prosekov et al., 2020; Cardoso and Cerecedo, 2019).

Research competencies involve the mobilization of conceptual, procedural, and attitudinal knowledge to address the challenges they encounter (Bucheli et al., 2019), based on ethical principles, social commitment, and scientific responsibility (Zarraga and Cerpa et al., 2023). They are a transversal component of any career (García and Aznar, 2019), crucial for successful professional performance (Enriquez et al., 2023), and essential for contributing effectively to the development of society (Sánchez and Rodríguez, 2023). Furthermore, the use of digital tools to efficiently and swiftly manage research processes is important (Zapata, 2022).

Regarding the term "research skills," it is used by Ipanaqué et al. (2023), Guerra et al. (2023), Romaniuk et al. (2023), Ciraso et al. (2022), Estrada et al. (2022), Díaz and Cardoza (2021), Vera et al. (2021), Rodríguez et al. (2020), Sokolova and Gilmutdinova (2019), Alfaro and Estrada (2019), and Poh and Kanesan (2019). The terms "research competencies" and "research skills" are being used as synonyms, although the term "skill" comes from the Latin *habilis*, meaning "capable of holding, moving, or handling with ease." Skills are structures of thought that allow for the assimilation, conservation, recall, application, and extrapolation of knowledge, transforming into actions that meet theoretical or practical requirements.

In the works included in this systematic review, research skills constitute a set of abilities to use theoretical knowledge in order to introduce innovations that solve practical problems (Romaniuk et al., 2023) through the research process (Ipanaqué et al., 2023). Research skills make it possible to use the scientific method and apply it in various professional or academic contexts (Estrada et al., 2022; Ciraso et al., 2022; Díaz & Cardoza, 2021) through research projects (Vera et al., 2021; Alfaro

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

& Estrada, 2019) with proficiency and ethics (Rodríguez et al., 2020). They involve analysis and reflection by students (Guerra et al., 2023), as well as the ability to learn and adapt, the capacity to formulate a research problem, the ability to analyze and master sophisticated computer tools, and the ability to work in an interdisciplinary environment (Sokolova & Gilmutdinova, 2019). Research skills are closely linked to self-efficacy in research, which is a perception of one's ability to conduct research, ranging from methodological design to the execution of the study and its subsequent publication (Poh & Kanesan, 2019).

Research competencies, sometimes referred to as research skills, can be categorized into generic ones, related to interpersonal or human qualities, and technical ones, associated with specific capabilities to carry out research. Each study has broken down these research competencies into dimensions, providing detailed information on how the specificity of these constructs is understood in each study. *Table 3* outlines the dimensions considered in each article reviewed.

Table 3

Dimensions of Research Competencies and Research Skills

Research Competencies		Research Skills	
Artículo	**Dimensiones**	**Artículo**	**Dimensiones**
Zarraga-Barreno et al. (2023)	Conception of competencies and research training Research competencies acquired in the training process Perception of the teacher's role in teaching-research competencies Difficulties in developing research competencies Educational demands for the development of research competencies	Ipanaqué-Zapata et al. (2023)	Use of catalogs Formulation of a scientific problem Selection of the population and sample Development and application of methods Analysis and processing of information Interpretation and discussion of results Preparation of conclusions and recommendations Writing the final thesis report
Gussen et al. (2023)	Affective-motivational domain Joy in conducting research Interest related to the value of research Perceived benefits of research for practice. Cognitive domain Ability to review the state of research Methodological competencies Ability to reflect on research results	Guerra et al. (2023)	Discourse management for constructing an academic text Formulation of the problem, objectives, and hypothesis Use of statistical methods for instrument validity Statistical data analysis APA style management
Enriquez et al. (2023)	General aspects and approach to the problem Theoretical framework and hypothesis Methodology Results, conclusions, recommendations, and bibliography	Romaniuk et al. (2023)	Formulation of objectives, hypotheses, choice of methods Building theoretical foundations, systematization of scientific information, and data collection Consultation with experts Argumentation Generalization of results Presentation of new research results Self-evaluation of results

Sánchez y Rodríguez (2023)	Basic competencies Skills in information searching and processing Methodological competencies Attitudinal competencies
Campos-Ugaz et al. (2022)	Problematization Theorization Verification of reality
Zapata (2022)	Research training in education Information search and registration Virtual communication and interaction Data/information collection and analysis Organization and systematization of information Dissemination and visibility of results
Chávez et al. (2022)	Cognitive competency Questioning competency Observational competency Reflective competency
Garay-Argandona et al. (2021)	Cognitive competencies Technological competencies Methodological competencies Project management competencies Teamwork competencies
Prosekov et al. (2020)	Motivational component Gnoseological component Operational component Personality component
Galustyan et al. (2020)	Motivational component Communicative component Reflective component Personal component
García-Gutiérrez y Aznar-Díaz (2019)	Ability to use observational methodology in the field Ability to analyze obtained data Relation of theory and practice Promotion of research and innovation Management of personal and professional development Reading scientific articles and literature
Bucheli et al. (2019)	Investigative competence Organizational competence Collaborative analytical competence Critical communicative competence
Cardoso y Cerecedo (2019)	Research design competencies Instrumental competencies Personal competencies Management competencies for dissemination
Ciraso-Calí et al. (2022)	Skills in reviewing the state of the art Methodological skills Reflective skills Communicative skills Knowledge of content
Estrada et al. (2022)	Correct formulation of the research question, general and specific objectives Convenient selection of theoretical foundations Creation of a glossary of terms and their interrelationship Search, process, and analyze information from various bibliographic sources
Díaz y Cardoza (2021)	Cognitive skills Technological skills Information search Building the theoretical framework Building the methodological framework Generating results Preparing references Evaluating the research experience
Vera-Rivero et al. (2021)	Use of catalogs, descriptor books, and preparation of bibliographic cards Formulation of a scientific problem, research objectives, and hypotheses Selection of the population, sample, and sampling method to use Selection, preparation, and application of methods, techniques, and instruments
Rodríguez-Vargas et al. (2020)	Cognitive dimension Procedural dimension Attitudinal dimension
Sokolova y Gilmutdinova (2019)	Ability to search for information Ability to analyze information Ability to write a scientific thesis Ability to present the thesis and engage in discussions about the topic

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Knyazyan y Mushynska (2019)	Development of the initial research base Study of theoretical information Data collection Data processing Development of the pedagogical experiment Argumentation of personal position Generalization of experimental data Forecasting research perspectives Presentation of results Publication of research results Self-evaluation
Alfaro-Mendives y Estrada-Cuzcano (2019)	Dimensions of language mastery Basic cognitive operations: knowing, observing, and questioning Social construction of knowledge Social construction of new knowledge
Poh y Kanesan (2019)	Research Self-Efficacy Research design skills Practical research skills Quantitative and computational skills Writing skills

On the other hand, it is important to note that there are studies where the approach to research competencies is done from the students' self-perception. In other studies, it is done through an external evaluation by experts, and some studies adopt both approaches. The studies that examined research competencies from self-perception are those by Zarraga and Cepar (2023), Ipanaqué et al. (2023), Guerra et al. (2023), Gussen et al. (2023), Ciraso et al. (2022), Díaz and Cardoza (2021), Garay et al. (2021), Vera et al. (2021), Rodríguez et al. (2020), Prosekov et al. (2020), Galustyan et al. (2020), García and Aznar (2019), Bucheli et al. (2019), Cardoso and Cerecedo (2019), and Poh and Kanesan (2019). Similarly, the studies that approached research competencies through evaluation by experts are those by Enriquez et al. (2023), Romaniuk et al. (2023), Campos et al. (2022), Estrada et al. (2022), Zapata (2022), Chávez et al. (2022), Sokolova and Gilmutdinova (2019), and Alfaro and Estrada (2019). The studies that consider both the students' self-perception and evaluation by experts are those by Sánchez and Rodríguez (2023) and Knyazyan and Mushynska (2019).

In the studies where the approach was from the students' self-perception regarding their research competencies, the most significant weaknesses or deficiencies identified by the authors correspond to the following aspects: perceived self-efficacy in research (Zarraga and Cerpa, 2023); use of academic databases, addressing the research topic, and statistical processing (Ipanaqué et al., 2023); limited research ability in the systematization of pre-professional practice (Guerra et al., 2023); lack of interest and low motivation to conduct research (Gussen et al., 2023); ability to review the state of the art (Ciraso et al., 2022); handling of statistical packages (Díaz and Cardoza, 2021); low methodological competencies (Garay et al., 2021); formulation of a scientific problem, objectives, and research hypotheses (Vera et al., 2021); attitude toward research (Rodríguez et al., 2020); conceptual limitations regarding the research process (Prosekov et al., 2020); self-organization, independence, self-education, self-regulation, self-determination, and self-development skills (Galustyan et al., 2020); reading skills (García and Aznar, 2019); data analysis using technological programs (Bucheli et al., 2019); preparation and publication of academic products (Cardoso and Cerecedo, 2019); and low levels of knowledge in research (Poh and Kanesan, 2019).

Regarding studies based on an external evaluation by experts, their authors identified weaknesses or deficiencies in students in the following aspects: the evaluated theses did not achieve favorable levels (Enriquez et al., 2023); low level of research skills (Romaniuk et al., 2023); insufficient understanding of the methodological, practical, and theoretical implications of research (Campos

et al., 2022); searching, processing, and analyzing information from different bibliographic sources (Estrada et al., 2022); quite incipient level of technological research competency (Zapata, 2022); students do not analyze or relate theoretical aspects to proposed situations (Chávez et al., 2022); writing of a scientific thesis (Sokolova and Gilmutdinova, 2019); and social construction of knowledge (Alfaro and Estrada, 2019). Regarding studies that approached research competencies from both the students' self-perception and an external evaluation by experts, their authors identified weaknesses in the search and processing of information (Sánchez and Rodríguez, 2023) and the development of models in the stage of pedagogical experiment formation (Knyazyan and Mushynska, 2019).

Regarding the results obtained in the reviewed articles, approached from the students' self-perception of their research competencies, Zarraga and Cepar (2023) studied the self-perception of university students on research training competencies and found that they perceive themselves as having competencies to collect and organize information, build theoretical systems, pose questions, and apply data collection techniques. Ipanaqué et al. (2023) evaluated the psychometric properties of a scale on research skills, and their results showed low ability to use databases such as Scopus or Web of Science, with the lowest research skills being problem formulation, objectives, and hypotheses. Regarding the work of Guerra et al. (2023), they studied the influence of systematizing pre-professional practice on research skills and determined that a low percentage of students considered themselves to have developed their research skills. Gussen et al. (2023) investigated the influence of a postgraduate module on the development of research competencies and found a decrease in the affective-motivational domain and an increase in the cognitive domain. Ciraso et al. (2022) studied the acquisition and development of research competencies in undergraduate education students and found a low valuation of competencies for content knowledge and review of the state of the art.

In this context, Díaz and Cardoza (2021) in their work investigated the relationship between skills and attitudes towards research in master's students and determined that there is a deficient level in the students' research skills, who assume a low and indifferent attitude towards research. Garay et al. (2021) described research competencies in postgraduate students in virtual learning environments and found that cognitive skills and teamwork abilities are the most predominant, while the weakest areas are related to technological competencies, methodological competencies, and project management. Vera et al. (2021) studied the self-assessment of research skills in teaching assistants in the Medicine program and found that third-year students mostly rated themselves at a moderately adequate level, while fourth and fifth-year students mostly rated themselves at an adequate level. Rodríguez et al. (2020) investigated the effects of applying the "researcher seedbed" pedagogical strategy on the development of research skills and found that the pedagogical strategy had a positive effect on the development of research skills. Prosekov et al. (2020) studied the level of development of research competencies and their structural components in university students, and their results show positive changes in the parameters of the components that together form the research competency, as well as an increased level of motivation.

Similarly, Galustyan et al. (2020) conducted a study on the formation of research competencies in students through mobile education, and the results showed a significant dynamic in the

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

development of research competencies in the experimental group. García and Aznar (2019) studied the development of research competencies in the training of professionals in early childhood education and found a favorable evaluation from the students regarding the processes developed by the academic program to enable the development of research competencies. Bucheli et al. (2019) in their work on research competencies and technological mediation in doctoral students in Ibero-America obtained higher percentages concerning inquiry competency, mainly in relation to searching and selecting information. Cardoso and Cerecedo (2019) studied the research competencies of postgraduate students in management and found that students have an insufficient level of development in their instrumental research competencies and knowledge dissemination. Similarly, Poh and Kanesan (2019) in their research on factors influencing research self-efficacy in postgraduate students found a moderate correlation between research self-efficacy and the research training environment.

Regarding the results obtained in the reviewed articles, which addressed research competencies of university students through expert evaluations, Enriquez et al. (2023) studied the relationship between formative research and achieving skills based on undergraduate thesis in education; as a result, they found that most of the evaluated students had achieved research competencies, with a smaller proportion still in the process of achieving them. Romaniuk et al. (2023) determined the research capabilities of future family doctors using test methods and expert evaluation, and they found that the number of students with high research skills in the third year of the medical career increased significantly. Campos et al. (2022) aimed to verify the effectiveness of formative research in strengthening research competency in university students and found that the subjects faced difficulties in developing their research skills.

Similarly, Estrada et al. (2022) studied the formation of research skills in engineering students in computer science and their results show that all students had limitations in mastering research skills. Zapata (2022) aimed to determine whether the implementation of an e-research proposal strengthens the technological research competency in master's students, and found that technological research competency was indeed strengthened through formative experiences in e-research. Chávez et al. (2022) in their work on the development of research competencies in students at the Universidad Señor de Sipán found that the development of research competencies in students was a result of the intervention.

Similarly, Sokolova and Gilmutdinova (2019) researched the influence of English lessons and student scientific conferences on the development of research skills in university students and determined that English lessons, together with participation in student conferences, effectively influenced the development of research skills. Alfaro and Estrada (2019) studied the effect of the "Seedbeds in the Classroom" program on the development of research skills in Library Science students, finding that the program had a significant effect on the development of research skills in students.

Regarding the results obtained in the reviewed articles that addressed students' self-perception of their research competencies, but also included an external evaluation or expert judgment, the study by Sánchez and Rodríguez (2023) was reviewed. They aimed to implement strategies to improve research competencies in university students in virtual education and found that after

the action-research conducted, the majority of students were at a medium or low level of the research competencies investigated. The work of Knyazyan and Mushynska (2019) related to the development of research competencies of translators in Ukrainian universities was also studied. Their results determined that students generally achieved research skills in all areas, but the highest results were obtained in the aspect of studying theoretical information and data collection in the field of didactic research.

When expanding the analysis to include the international perspective, significant differences were observed in the approaches and results of studies conducted in various countries and cultural contexts. In Peru, where 44% of the studies were conducted, quantitative approaches predominated, with a strong focus on identifying weaknesses in specific competencies such as the use of academic databases, the ability to systematize pre-professional practice, and the handling of statistical software (Ipanaqué et al., 2023; Guerra et al., 2023; Díaz and Cardoza, 2021). Peruvian studies also stood out for implementing experimental and quasi-experimental designs to evaluate educational interventions, as observed in the work of Campos et al. (2022) and Rodríguez et al. (2020). In contrast, other Latin American countries like Chile, Argentina, and Colombia have addressed research competencies from more qualitative and descriptive approaches, focusing on perceived self-efficacy and the analysis of acquiring competencies through phenomenological and descriptive studies (Zarraga and Cepar, 2023; Bucheli et al., 2019).

In Europe, the studies also showed notable methodological diversity and an emphasis on the external evaluation of competencies. In Germany, for example, Gussen et al. (2023) used a quasi-experimental design to study the influence of a postgraduate module on research competencies, highlighting a decrease in the affective-motivational domain. In Ukraine, both Romaniuk et al. (2023) and Knyazyan and Mushynska (2019) used test methods and expert evaluation to determine students' research capabilities, finding significant improvements in research skills over the course of academic training. In Russia, Prosekov et al. (2020) and Galustyan et al. (2020) focused on evaluating the structural components of research competencies, observing positive changes in students' motivation and methodological skills. These European studies were notable for their systematic and rigorous approach to evaluating competencies, often using experimental and explanatory designs.

In other international contexts, such as Malaysia and Kazakhstan, the studies also reveal interesting particularities. Poh and Kanesan (2019) in Malaysia found a moderate correlation between research self-efficacy and the research training environment, emphasizing the importance of the educational context in the development of competencies. In Kazakhstan, Mamytbayeva et al. (2022) conducted a descriptive study to analyze research competencies in students, highlighting significant deficiencies in the ability to search for, process, and analyze bibliographic information. These findings suggest that research competencies are influenced not only by the pedagogical methods applied but also by the specific cultural and educational context of each country, requiring approaches that consider contextual aspects for the effective development of these competencies.

The findings obtained from scientific productions indexed in Scopus regarding research competencies in university students reflect the existing interest in the subject, which has mainly been addressed from a quantitative approach, with a focus on the self-perception of students

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

regarding their research competencies. Comparatively, there are fewer studies where research competencies are examined through external judgment or evaluation.

This systematic review provides a panoramic view of the characteristics and trends of mainstream empirical research published in the Scopus database concerning research competencies in university students. This may be useful for researchers interested in the state of the art, as well as for university authorities and academic managers responsible for formulating institutional policies, curriculum designs, and planning educational processes.

Conclusions

Based on the results of this systematic review of the scientific production published in Scopus regarding research competencies in university students, the following conclusions have been drawn.

The scientific production in Scopus that has been studied is characterized by peaks in publication in the years 2023 and 2019, with a significantly high number of works produced in Peru, predominantly published in journals ranked in the Q1 and Q2 quartiles. Nearly half of the publications are in Spanish, with a predominance of a quantitative approach, as well as a preference for experimental, quasi-experimental, and pre-experimental designs.

Regarding the findings from the articles reviewed, the analysis began with a conceptual precision regarding the terms “research competencies” and “research skills,” finding that both are used synonymously and reflect a strong influence of the competency-based approach. There is a variety of ways to break down these research competencies, but they always include competencies related to interpersonal (generic) abilities and specific skills for conducting research (technical). Moreover, in most studies, research competencies are assessed from the student’s self-perception. The results obtained from the studies show various levels of achievement of research competencies, with the methodological designs providing valuable support for conducting new and necessary research.

References

Alfaro, K. y Estrada, A. (2019). Programa "Semilleros en aula" en el desarrollo de destrezas investigativas de los estudiantes de bibliotecología de la Universidad Nacional Mayor de San Marcos. *Revista Interamericana de Bibliotecología, 42*(3), 235–250. https://doi.org/10.17533/udea.rib.v42n3a04

Campos, O., Campos, W., Hernández, R., Aguinaga, S., Falla, J., Saavedra, M., y Garay, R. (2022). Formative Research to Strengthen Enquiry Competence in University Students. *International Journal of Learning, Teaching and Educational Research, 21*(11), 443-464. https://doi.org/10.26803/ijlter.21.11.25

Cardoso, E. y Cerecedo, M. (2019). Evaluación de las competencias investigativas de los estudiantes de posgrados en administración. *Formación Universitaria,12*(1), 35-44. http://dx.doi.org/10.4067/S0718-50062019000100035

Chávez, K., Ayasta, L., Kong, I. y Gonzales, J. (2022). Formación de competencias investigativas en los estudiantes de la Universidad Señor de Sipán en Perú. *Revista de Ciencias Sociales, 28*(1), 250-260. https://doi.org/10.31876/rcs.v28i1.37689

Ciraso, A., Martínez, J., París, G., Sánchez, A., y García-Ravidá, L. (2022). The research competence: acquisition and development among undergraduates in education sciences. *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.836165

Díaz, M. y Cardoza, M. (2021). Habilidades y actitudes investigativas en estudiantes de maestría en educación. *Revista Venezolana de Gerencia, 26*(6), 410- 425. https://doi.org/10.52080/rvgluz.26.e6.25

Enriquez, G., Zevallos, E., Zenteno, F., Pariona, D., y López, R. (2023). Formative research and the achievement of skills based on undergraduate theses in university higher education. *Journal of Technology and Science Education, 13*(2), 498-498. http://dx.doi.org/10.3926/jotse.1744

Estrada, O., Fuentes, D., y Grass, W. (2022). La formación de habilidades investigativas en estudiantes de ingeniería en ciencias informáticas desde la asignatura de gestión de software: Un estudio de caso en la universidad de las ciencias informáticas, Cuba. *Ingeniare. Revista Chilena de Ingeniería, 30*(1), 109-123. http://dx.doi.org/10.4067/S0718-33052022000100109

Galustyan, O., Borozdin, S., Pleshakov, M., Askadulina, N., y Rádchenko, L. (2020). Formation of research competence of students by means of mobile education. *International Journal of Interactive Mobile Technologies, 14*(14), 205- 213. https://doi.org/10.3991/ijim.v14i14.15047

Garay, R., Rodríguez, M., Hernández, R., Carranza, R., y Turpo, J. (2021). Research competences in university students in virtual learning environments. Cypriot *Journal of Educational Sciences, 16*(4), 1721-1736. https://doi.org/10.18844/cjes.v16i4.6031

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

García, Z. y Aznar, I. (2019). El desarrollo de competencias investigativas, una alternativa para formar educadores infantiles como docentes-investigadores. *Educare, 23*(1), 1-22. https://doi.org/10.15359/ree.23-1.15

Guerra, M., Reynosa, E., Durand, E., Acero, Y., Florez, A., Callata, B., Guillén, M., Payé, R., y Callejas, J. (2023). Pre-professional practice systematization and its relationship to research skills. *Frontiers in Education, 8*. https://doi.org/10.3389/feduc.2023.1185906

Gussen, L., Schumacher, F., Großmann, N., Ferreira, L., Schlüter, K., y Großschedl, J. (2023). Supporting pre-service teachers in developing research competence. *Frontiers in Education, 8*. https://doi.org/10.3389/feduc.2023.1197938

Hernández, R. y Torres, C. (2018). *Metodología de la investigación: las rutas cuantitativa, cualitativa y mixta*. McGraw Hill.

Infante, L. (2021). Formación en competencias investigativas como estrategia pedagógica de la educación comprometida con el bienestar social. *Revista de Filosofía, 38,* 125-140. https://doi.org/10.5281/zenodo.5142623

Ipanaqué, M., Figueroa, J., Bazalar, J., Arhuis, W., Quiñones, M., y Villarreal, D. (2023). Research skills for university students' thesis in E-learning: Scale development and validation in Perú. *Heliyon, 9*(3). https://doi.org/10.1016/j.heliyon.2023.e13770

Knyazyan, M. y Mushynska, N. (2019). The formation of translators' research competence at the universities of ukraine. *Journal of Teaching English for Specific and Academic Purposes, 7*(1), 85-94. https://doi.org/10.22190/JTESAP1901085K

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., y Stewart, L. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews, 4*(1), 1-9. https://doi.org/10.1186/2046-4053-4-1

Poh R. y Kanesan, A. (2019). Factors influencing students' research self-efficacy: A case study of university students in Malaysia. *Eurasian Journal of Educational Research,* (82), 137- 168. https://dergipark.org.tr/en/pub/ejer/issue/48089/608165

Prosekov, A., Morozova, I., y Filatova E. (2020). A case study of developing research competency in university students. *European Journal of Contemporary Education, 9*(3), 592-602. https://eric.ed.gov/?id=EJ1272421

Rodríguez, M., Alcázar, O., Gil, S., Garay, R., y Hernández, R. (2020). Researchers' seedbeds for the development of research skills in universities. *International Journal of Criminology and Sociology, 9*, 961- 967. https://doi.org/10.6000/1929-4409.2020.09.101

Romaniuk, D., Karpenko, Y. y Kichuk, A. (2023). The formation of medical students' research skills in teaching professional English. *Ezikov Svyat, 21*(2), 96-101. https://doi.org/10.37708/ezs.swu.bg.v21i2.12

Sánchez, M. y Rodríguez, E. (2023). Estrategias para mejorar las competencias investigativas en un contexto virtual de aprendizaje. *Revista Internacional de Humanidades, 18*(1), 1-15. https://doi.org/10.37467/revhuman.v18.4860

Sokolova, I. y Gilmutdinova, I. (2019). Formation of the research skills of students during studying the foreign language (English) at the university. *Humanities and Social Sciences Reviews, 7*(6), 33-37. https://doi.org/10.18510/hssr.2019.768

Tobón, S., Pimienta, J., y García, J. (2010). *Secuencias didácticas: aprendizaje y evaluación de competencias*. Pearson Educación.

Vera, D., Chirino, L., Ferrer, L., Blanco, N., Amechazurra, M., Machado, D., y Moreno, K. (2021). Autoevaluación de habilidades investigativas en alumnos ayudantes de una universidad médica de Cuba. *Educación Médica, 22*(1), 20-26. https://doi.org/10.1016/j.edumed.2018.11.009

Veytia, M., Galán J., y Morales, M. (2019). Competencias investigativas y mediación tecnológica en doctorandos de Iberoamérica. *International Journal of Educational Research and Innovation,* (12), 1-19. https://doi.org/10.46661/ijeri.4007

Wessels, I., Rueß, J., Jenßen, L., Gess, C., y Deicke, W. (2018). Beyond cognition: Experts' views on affective-motivational research dispositions in the social sciences. *Frontiers in Psychology, 9*. https://doi.org/10.3389/fpsyg.2018.01300

Zapata, J. (2022). Competencia en investigación electrónica e investigación tecnológica en la formación del profesorado. *Revista Internacional de Humanidades, 12*(5), 1-11. https://doi.org/10.37467/revhuman.v11.3984

Zarraga, J. y Cerpa, C. (2023). Percepción de estudiantes universitarios sobre la formación en competencias de investigación. *Formación Universitaria, 16*(5), 73-82. http://dx.doi.org/10.4067/S0718-50062023000500073

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1234 • e-ISSN: 2631 - 2786

Educational Technology and Meaningful Learning: The Impact of Infopedagogical Resources on Teacher Training

Tecnología educativa y aprendizaje significativo: impacto de los recursos infopedagógicos en la capacitación docente

Date of receipt: 2024-03-04 • Date of acceptance: 2024-09-11 • Date of publication: 2025-01-10

Holguer Rolando Manotoa-Labre [1]
Ministerio de Educación, Ecuador
holguer.manotoa@educacion.gob.ec
https://orcid.org/0000-0002-7910-6179

Ana Gabriel Pimbo-Tibán [2]
Ministerio de Educación, Ecuador
anag.pimbo@educacion.gob.ec
https://orcid.org/0000-0001-6964-9244

Susana Yolanda Tibán-Chaza [3]
Ministerio de Educación, Ecuador
susana.tiban@educacion.gob.ec
https://orcid.org/0000-0001-7722-5548

Marco Miranda Pinos-Miranda [4]
Ministerio de Educación, Ecuador
marco.pinosm@educacion.gob.ec
https://orcid.org/0009-0001-8625-4591

Abstract

The continuous technological advancement transforms the way we interact, learn, and work. In the educational sphere, it generates the need for ongoing training for teachers in the use of methodologies, software, and educational tools with the aim of integrating technology into the teaching-learning process, adopting an Infopedagogical approach. In this context, the focus of this study is the analysis of the existing connection between teacher training and the creation of meaningful knowledge in students; hence, the challenge is taken to conceptualize, identify, and implement a training program with the collaboration of 67 educators from "Nuestra Señora de Pompeya" Educational Unit, centered on the implementation of a training program exclusively designed for this group of professionals, based on their training demands and framed comprehensively in five relevant technological tools. The dynamic interaction of teachers allowed assessing the usefulness and ease of use of technology in the educational context and understanding that ongoing training for educators become an essential element to address the demands of technological advances and strengthen daily pedagogical practice adapted to various educational contexts.

Keywords: training, teaching, meaningful learning, infopedagogy, pedagogical practice

Resumen

En el ámbito educativo, el continuo avance tecnológico transforma la manera en la que estudiantes interactúan, aprenden y trabajan. Esto genera la necesidad de formación continua en los docentes sobre el manejo de metodologías, software y herramientas educativas, con el objetivo de integrar la tecnología en el proceso de enseñanza-aprendizaje, adoptando un enfoque Infopedagógico. El centro de atención de este estudio fue el análisis de la conexión existente entre la formación del personal docente y la creación de conocimientos significativos en los educandos. Por ello, se asumió el reto de conceptualizar, identificar y ejecutar un programa de capacitación con la colaboración de 67 educadores de la Unidad Educativa "Nuestra Señora de Pompeya" centralizado en la implementación de un programa de capacitación diseñado exclusivamente para este grupo de profesionales, basado en sus demandas formativas y enmarcado de manera integral en cinco herramientas tecnológicas de relevancia. La interacción dinámica de los docentes permitió evaluar la utilidad-facilidad de uso de la tecnología en el ámbito educativo y comprender que la formación continua de los educadores se convierte en un elemento esencial para hacer frente a las exigencias de los avances tecnológicos y fortalecer la práctica pedagógica diaria adaptada a diversos contextos educativos.

Palabras clave: capacitación, enseñanza, aprendizaje significativo, infopedagogía, práctica pedagógica

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

To work as educators, individuals must develop specific pedagogical competencies. However, in today's world, beyond this set of skills and knowledge, it is essential for teachers to stay updated and trained in the use of the latest technological tools. Recognizing the urgent need for educators to remain up to date is crucial to addressing the ever-changing demands of technological advancements.

This process of continuous updating not only involves keeping up with the latest technologies but also adapting and strengthening teaching strategies and methodologies across various educational contexts. The agility and willingness to incorporate new tools and pedagogical approaches are crucial for tackling contemporary challenges in education (García et al., 2022).

Teacher training plays a fundamental role in personal responsibility for acquiring new knowledge, improving skills, and fulfilling aspirations with a transformative and self-transformative impact on social reality (Nieva & Martínez, 2016). In the educational field, the exchange of knowledge acquired during professional training is necessary but not sufficient. Constant updating and exploration of new and original pedagogical tools and resources are equally important. These practices not only directly impact students' academic satisfaction but are also closely linked to innovative teaching approaches. Inclán (2021) asserted that teacher training, as a public and educational policy, should focus on preparing educators to acquire the necessary knowledge, attitudes, and skills to effectively carry out their work in the classroom and the school community.

The COVID-19 viral outbreak in 2020 significantly impacted many areas, including education. It drastically changed the way educational actors interacted, the teaching-learning process, and the overall learning environment. In response to the health emergency, governments mandated the continuation of classes through virtual learning models, creating uncertainty and insecurity among teachers accustomed to face-to-face instruction (Rodríguez, 2021). Díaz (cited in González, 2021) stated that the pandemic exposed the lack of teachers' readiness for digital instruction, with only 2% of them being adequately prepared. Given this reality, teacher training became crucial during the COVID-19 era to help educators overcome the new challenges that emerged in the educational sector.

According to a survey conducted by UNICEF, UNESCO, and the World Bank on teacher training processes and professional support, training efforts focused on the use of technology in education (including infopedagogical resources) and the development of ICT-related competencies. The survey results revealed a significant gap between middle-low-income and high-income countries, with high-income nations providing 71% of support compared to just 10% in middle-low-income countries (UNESCO, 2021).

Another UNESCO-led study revealed that, globally, 81% of primary school teachers and 78% of secondary school educators barely met the minimum requirements to deliver quality education. This finding highlights that many educators are not adequately prepared to face the challenges of virtual education. The situation in Latin America and the Caribbean is even more concerning, as 83% of primary school teachers and 84% of secondary school teachers lack essential tools to

tackle the challenges brought by pandemic-era education (UNESCO, 2020). UNESCO emphasized that, to prevent an educational crisis, governments, NGOs, and various educational institutions were compelled to invest in teacher training to enhance their competencies.

In response to this challenge, Ecuador's Ministry of Education restructured the national curriculum and implemented digital platforms to support teacher training and help educators navigate the demands of remote education. The ministry launched a training initiative that encouraged teachers to unlearn and relearn in order to sustain and support education, aligning with Objective 2 of Ecuador's COVID-19 Humanitarian Response Plan. This plan outlined several strategies to support distance learning, including:

- Online platforms enabling teachers and students to access learning materials, educational resources, and real-time communication tools.
- Tele-education through real-time communication tools such as phone calls and video conferencing to facilitate teacher-student interaction.
- Radio-based education for students lacking access to digital platforms or technological resources.
- Innovative teaching practices incorporating phones, social media, and digital platforms to adapt to the new educational landscape.
- Curriculum adaptation to ensure students develop relevant skills within the remote education context (UNICEF, 2020).

As part of the COVID-19 Humanitarian Response Plan, Ecuador's Ministry of Education launched a nationwide online teacher training program in 2020, offering a variety of courses aimed at preparing educators for the challenges of virtual teaching (Ministry of Education, 2021). However, according to the *Mecapacito* platform, of all the available courses, only one addressed topics related to the use of Information and Communication Technologies (ICT).

Data from *Mecapacito* revealed that in 2020, a total of 2,927 educators in the province of Pastaza received training. However, only a small group of 230 high school teachers benefited from the emergency program implemented by the Ministry of Education (2020). This limited number of trained teachers highlighted the urgent need to establish a specific training program focused on the management and creation of infopedagogical resources (Manotoa, 2022).

Based on the elements discussed in the previous paragraphs, this study will present several scientific foundations to develop a state-of-the-art analysis and propose a training program centered on educators' training needs regarding infopedagogical resources. The goal is to provide teachers with the necessary skills for creating and managing online pedagogical resources, thereby enhancing their ability to develop and conduct virtual academic activities that improve students' knowledge acquisition.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

1.1. ICT in Education

The development of these technologies is due to progress in computer engineering, communications, and human knowledge. They are created and offered to people to facilitate information management and enable its immediate and simultaneous sharing. Technological advancements and telecommunications have generated new job opportunities and contributed to societal progress and well-being (Universidad Latina de Costa Rica, 2019).

Regarding the contribution of technology to society, its impact became particularly evident during the declaration of the health emergency when society at large was forced to adopt telework and conduct various activities online due to confinement.

The rapid spread of COVID-19 led employers and companies to restructure the work environment, adapting and modifying their strategies to face the challenges presented by the health crisis. Telework emerged as an alternative resulting from the global social situation, offering an innovative way to continue educational work. It allowed educators to adapt to the restrictions imposed by the health crisis, facilitating the continuity of distance learning.

Camacho (2021) defined telework as all activities carried out to achieve a specific objective, solve problems, and meet human needs through information and communication technologies (ICT). Its implementation in the educational field confronted teachers with various challenges related to the use of digital platforms, interactive tools, and online resources.

The transition to a new educational paradigm required the acquisition of technological skills and adaptation to virtual environments, making it a demanding process. Despite these challenges, educators demonstrated remarkable resilience in overcoming technological difficulties and worked tirelessly to ensure the effective delivery of educational content.

This strategy to guarantee the constitutional right to education and maintain teaching and learning processes during the pandemic highlighted not only the need for greater support in developing teachers' digital skills but also the importance of recognizing and valuing their dedication amid the complexities of educational telework (Ramírez et al., 2021).

During the pandemic, implementing telework in distance education required the establishment of guidelines to ensure proper practices in labor, social, and technological fields, in compliance with the existing legal framework, aiming for positive outcomes for educational institutions, teachers, and students (Ramírez et al., 2021).

According to Ministerial Agreement AM-MDT-2020-181, Article 4, regarding telework tools, the employer is responsible for providing employees with the necessary equipment, guidelines, and supplies to perform telework. Additionally, the employer must inform workers about the directives for supervising and monitoring their tasks (Ministry of Labor, 2020). During the pandemic, telework in distance education became a necessity, leading to the creation of directives that ensured its proper implementation. These regulations aimed not only to comply with the legal framework but also to ensure that educational institutions, teachers, and students achieved positive results.

1.2. Educational Plan During the COVID-19 Pandemic by the Ministry of Education of Ecuador.

During the health emergency caused by the COVID-19 pandemic, on March 16, 2020, Minister Monserrat Creamer and the Ministry of Education of Ecuador introduced the "Covid-19 Educational Plan," aimed at adapting and strengthening the country's educational system in response to the situation. This plan included pedagogical activities, measures, and strategies designed to ensure the continuity of educational services, support the educational community in preventing COVID-19, and provide emotional support to students and teachers. Additionally, the plan established guidelines for remote work in the educational sector, including the provision of resources and appropriate conditions to fulfill work responsibilities (Bonilla, 2020; Ministry of Education, 2020).

Initially, this process was framed by the transition from in-person classes to virtual environments, as established in AGREEMENT No. MINEDUC-MINEDUC-2020-00014-A, which ordered the nationwide suspension of academic activities. This measure affected public, faith-based, and private educational institutions, as well as early childhood development centers regulated by this government entity, across all schedules and modalities. Likewise, educational staff were required to continue their work through remote modalities in accordance with the regulations issued by the supervisory labor authority for this purpose (Ministry of Education, The implementation of the Educational Plan during the COVID-19 pandemic was structured around four fundamental elements: Prioritized Curriculum, which identified key topics for each educational stage based on the community's needs during the pandemic. Educa Contigo Portal, which provided alternatives and support for students who lacked internet access due to various factors. This included learning materials, educational content, and digital tools delivered through traditional communication channels such as television and radio, with specific schedules for different educational levels. Educational Portal, which offered access to educational materials, review resources, socio-emotional support, and tools to ensure the continuity of educational services during various stages and situations of the health emergency. According to Varguillas and Bravo (2020) and NU. CEPAL - UNESCO (2020), it was essential to have tools that facilitated information acquisition from multiple sources, such as television programs, radio, or written materials. Educational Transformations, which encompassed the structural and pedagogical changes implemented in the country's education system (Ministry of Education, 2020)

The COVID-19 Educational Plan was organized into two main phases: "*We Learn Together at Home*" and "*Together We Learn and Take Care of Each Other*." Each phase had specific conceptual frameworks, execution resources, and operational rules. The first phase, "*We Learn Together at Home,*" focused on providing didactic actions, educational content, and tools to facilitate home-based learning under the supervision of families and tutors. The second phase, "*Together We Learn and Take Care of Each Other,*" expanded education into public and social spaces while emphasizing COVID-19 prevention and psychological support (Ministry of Education, 2020).

1.3. Regulations and Integration of ICT in Educational Spaces.

The technological dimension of Ecuadorian education is regulated. In the third section on Communication and Information, the Constitution of the Republic of Ecuador states that "all

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

individuals, individually or collectively, have the right to (…) universal access to information and communication technologies" (Constitution of the Republic of Ecuador, 2008, Art. 16).

Building upon this, it was established that all individuals have the opportunity to use and benefit from information and communication technologies, regardless of their origin, gender, age, geographic location, or any other personal characteristic. This right is considered fundamental to ensuring equal opportunities and access to information and knowledge in today's society. Similarly, it was reiterated that the State will promote diversity and plurality in media, guaranteeing universal access to ICT for all citizens, with a particular focus on individuals and groups who lack access or face limitations in using these technologies (Constitution of the Republic of Ecuador, 2008, Art. 17). The State's responsibility was also emphasized in eliminating digital illiteracy, ensuring that people acquire the necessary access and skills to interact effectively with information and technologies. Additionally, it is the State's duty to incorporate ICT into education and foster the development of skills and knowledge related to these technologies (Constitution of the Republic of Ecuador, 2008, Art. 347).

The Organic Law of Intercultural Education (LOEI) (2016) established interlearning and multi-learning as key principles for decision-making and the development of activities in educational settings. These were considered educational strategies that enhance human capabilities through interaction, collaboration, and group learning in areas such as culture, sports, access to information and technology, communication, and knowledge. Similarly, the Organic Law of Higher Education (LOES) (2016) made the use of digital technologies mandatory and stipulated that resource allocation must also be directed toward acquiring technological infrastructure.

Having a regulatory framework to guide educational practices from a technological perspective is not enough to guarantee educational quality. Although there are clear regulations regarding technology in education, their mere existence does not ensure successful implementation or the full utilization of all available tools. Legislation alone does not replace the existing needs of teachers and the education system to adapt to the new technological reality. For this reason, it is essential to provide teachers with the necessary training in educational technology, adequate technological infrastructure, and a culture that fosters innovation and adaptability to technological advancements.

1.4. Teacher Training in Digital Competencies for Navigating Virtual Environments.

Digital competencies refer to a set of skills, attitudes, and knowledge that guide the effective use of digital technological tools in multiple contexts; they not only involve the use of such tools but also imply the critical understanding of information, online work, critical use of digital tools, and adaptation to different environments (Vargas, 2019).

The European Commission (2007, cited in Salas et al., 2022) established as basic competencies in the fundamental skills of Information and Communication Technologies (ICT) the ability to use computers to access, evaluate, store, create, present, and exchange information, as well as to communicate and participate in online collaboration networks (UNESCO, 2018). For educators to

develop digital competencies, it is essential that they undergo training, stay updated, and share knowledge with their students. Furthermore, they must use the appropriate technological tools to strengthen this process and achieve a paradigm shift. Educators who possess these competencies are prepared to face the challenges of contemporary education in the 21st century.

Technology offers a wide range of resources and tools that are fundamental to teaching; therefore, it is essential to conduct training processes in the proper use of computer tools to foster effective teaching methods. This involves applying pedagogical approaches tailored to needs, but with an innovative focus that maximizes the potential of new technologies (Pinto and Plaza, 2020).

Digital literacy for educators is crucial regarding their mastery of technology and its incorporation into teaching-learning processes. To boost teachers' digital competency and promote innovation in education, the European Framework for Digital Competence of Educators (DigCompEdu) was published in 2017. This framework integrated practices, concepts, and criteria to propose, adapt, guide, and implement policies for teacher training and professional development; it also aimed to determine, evaluate, and improve teachers' digital competencies to include digital technologies meaningfully in pedagogical work, teaching-learning processes, and to awaken or support students' digital competencies (Cabero et al., 2022).

The Ministry of Education and Vocational Training and the educational administrations of autonomous communities (2022) outlined the competency areas of DigCompEdu as follows:

- **Professional Commitment:** the ability to use technology to improve teaching processes and professionally interact within the educational community (Cabero Almenara and Palacios, 2020).
- **Digital Resources:** searching/selecting/creating/modifying/using/sharing/managing digital resources or content responsibly in the educational process (Cabero Almenara and Palacios, 2020).
- **Digital Pedagogy (Teaching-Learning):** the ability to plan/design and implement ICT during various stages of the educational process (Cabero Almenara and Palacios, 2020).
- **Assessment-Feedback:** linking tools and digital strategies for assessment; empowering students, developing student-centered strategies to encourage active participation (Cabero Almenara and Palacios, 2020).
- **Facilitating Digital Competence in Students:** integrating digital skills into the curriculum and educational process, providing adequate follow-up to assess their development (Cabero Almenara and Palacios, 2020).

In line with the described competency areas, the educational system has presented some challenges in the current context in which teachers operate. One way to generate integrated work is to direct teacher training and development towards the development of generic competencies (Andrade et al., 2020). Therefore, it is important in the educational field to have programs tailored to existing needs that improve teachers' performance and their ability to effectively apply their role. The Organic Law of Intercultural Education (2016) established that teachers have the right to free

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

access to opportunities for professional development, training, updating, continuous learning, and pedagogical and academic improvement at all levels and modalities, adapted to individual and the National Education System's needs.

1.5. Infopedagogical Resources.

Educational environments rely on digital tools that enable the creation of favorable learning spaces for cognitive skill development. These resources must be systematically managed by educators who, through practical pedagogical methodologies, enrich dynamic and evolving learning environments.

Digital educational resources facilitate the demonstration, observation, and understanding of complex concepts, while Information and Communication Technologies (ICT) provide access to a variety of information to support both collaborative and autonomous student work efficiently (Álvarez Santizo, cited in Manotoa, 2022).

The WHO's declaration of lockdown led to the integration of web resources with pedagogical methods, transforming traditional education paradigms into a Connectivist Paradigm. In this new model, applications and digital tools have been essential for displaying, interacting, evaluating, and sharing knowledge between students and teachers. It is crucial to discern and categorize the vast array of digital material to establish a concept based on its capabilities and utility.

Table 1 presents the most important and popular web resources that have facilitated teachers' work.

Table 1

Infopedagogical Resources.

Tools-Description
Videoconferencing Tools: In a context of simultaneous and bidirectional communication, which takes place synchronously and in real-time over a distance, it is a process of establishing dialogues between two or more people. During the lockdown, the need for interaction led videoconferencing applications to become essential tools (Torres, 2021).
Zoom: Enables instant meetings and group text messaging. Additionally, it provides a unique experience in the simultaneous transmission of multimedia content through sound and image, with the ability to share the screen so users can view it (Casarotto, 2021). Microsoft Teams: This flagship platform from the corporate giant Microsoft brings together many utilities for communication and collaboration; it offers a wide range of tools to simplify videoconferences, meetings, group chats, and calls (Serrano, 2021).
Tools for Presenting Information: These tools allow summarizing curricular topics, transforming them into interactive, stimulating, and attractive lessons that engage students and facilitate their understanding (Pimbo et al., 2023).
Genially: Allows the creation of multimedia content in a simple and interactive way, using pre-designed templates (Hernández, 2018). Its design focuses on the following principles: animation to bring images to life, interactivity to involve the student, and integration with different add-ons for optimal connection with the platform (Allende, 2021). Prezi: Facilitates the creation of innovative and creative multimedia content, presenting it in a visually interactive manner using the "canvas." As the presentation progresses, visual elements, graphics, and sections appear and disappear in a dynamic way (Universidad Nebrija, 2018).
Herramientas para la evaluación del conocimiento: Instruments for measuring retention and comprehension of information; they provide means to reinforce knowledge, strengthen learning, resolve doubts, self-assess, and evaluate mastery of concepts (Pimbo et al., 2023).
Kahoot Platform: A novel environment for creating assessments in a quiz format with a playful approach, presenting information in the form of challenges and competitions. Participants answer from their devices, and during the game, a ranking of participants' positions is displayed. It focuses on engaging each student, turning a monotonous class into an interactive and fun game (UNADE, 2021). Quizziz Platform: Allows the creation of fun online quizzes, using game elements and encouraging healthy competition among students. The platform enables the creation of tools with different types of questions, such as single-choice, multiple-choice, fill-in-the-blank, essays, and surveys. These questions can be customized with images, audio, videos, links, and equations to meet the specific needs of the user (Manotoa, 2022).
Online Forms: Google Forms, among its features, includes creating quizzes, surveys, tests, and exams; it also allows the automation of evaluations and immediate viewing of results. Additionally, it generates reports in tables and charts based on the data collected (Naranjo, 2021).
Tools for Consolidating Learning: Simplifies the management of information, promotes the development, and builds specific concepts related to academic content (Pimbo et al., 2023).
Mural Platform: Offers the possibility of creating a dynamic and collaborative environment for all session participants, where each member can contribute their ideas and viewpoints using a variety of visual and multimedia resources. This favors cooperation in constructing cognitive maps, diagrams, or any other visual representation of the content to be analyzed. The tool also facilitates real-time or delayed collaboration by sharing the board through a web link, allowing students to work at their own pace (Arana, 2021b).

Note: Adapted from Manotoa (2022).

Methodology

The research was conducted at the Fiscomisional Educational Unit "Nuestra Señora de Pompeya," located on Av. Alberto Zambrano and Calle 9 de Octubre in the city of Puyo. This mixed-management institution is under the direction of the "Las Marianitas" Congregation and is co-

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

administered by Zone 3 of Educational District 16D01 in the province of Pastaza. It stands out for its long history of shaping individuals with integral Christian values and scientific knowledge.

The study employed an experimental methodology that included a pre-test to establish initial perceptions and design the experiment. The study was applied, evaluated, and verified using the TAM methodology to analyze the relationship between educational resources and trained personnel. A diagnostic assessment was conducted with a random group of 43 teachers before the experiment to collect essential data, followed by an evaluation of 67 teachers after the experiment's implementation. The TAM method was used to understand perceptions and validate the proposed hypothesis.

To begin the experimentation process, data was initially collected through a diagnostic survey to examine the use of infopedagogical resources-tools in teaching practice. Then, the TAM model was used to gather data on the achievements attained after the training experience. The surveys used for the pretest and posttest were statistically validated in advance using Cronbach's Alpha statistic. The research was conducted following the ADDIE framework, which corresponds to the progressive development of the following stages: Analysis, Design, Development, Implementation, and Evaluation, as detailed below:

- Analysis: A diagnostic assessment was conducted to establish the study population's baseline using a pre-test. The findings highlighted the need to develop and implement a virtual training plan for teachers. Five online platforms were identified as relevant to the teaching-learning cycle, as introduced earlier.
- Design: Once the key tools facilitating pedagogical activities in the virtual classroom were identified, the following platforms were selected: Zoom Meetings, Prezi, Mural, Quizziz, and Online Forms. These were categorized and structured by content units, specific topics, essential content, and learning outcomes, according to the needs and available time. The content progressed from basic skills (account creation) to expert-level management of tools for innovative educational processes.
- Development: The virtual environment for experimentation and implementation of the training plan was created through the acquisition of web hosting services and the registration of the domain https://capacitaciondocente.website through the company Namecheap. After installation, the WordPress content management system was implemented, along with the necessary plugins that facilitated the organization and development of the website.
- Within the platform, the list of available courses, detailed information about the instructor, project details, contact information, an internal search engine, and a link to the user panel were included. Upon accessing the user panel, personal data, descriptions of the courses associated with the account, and progress in each of the created contents were displayed.
- Each course presented a structured curriculum in sections accessible to users enrolled in the platform. These sections were divided into: introduction, conceptualization and functionality of the tools, demonstrative examples, and evaluation.

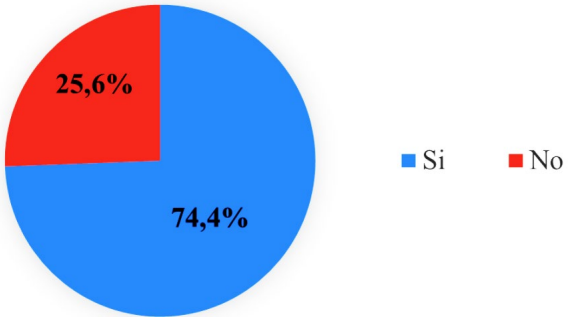
- Implementation: The experimental phase involved 67 educators from the institution under study. The training plan was carried out during the last fifteen days of January 2022 through the virtual platform Zoom, divided into 5 sessions of three hours each, with each session focusing on the topics previously established for each tool.
- Evaluation: The study consisted of an experiment that, at the end, was evaluated through an instrument that collected the opinions of the participants regarding the implemented program. For this purpose, the Technology Acceptance Model (TAM) was used, a tool employed in the computer and technology field to assess and verify results related to the adoption of new innovative applications.

Results

Initially, a pretest with 21 questions was applied to a randomly selected diagnostic group of 43 teachers. In general, the test covered aspects such as knowledge, usage, advantages, and disadvantages of Web 3.0 tools, highlighting the most significant findings, as presented in *Figure 1*.

Figure 1

Knowledge of Infopedagogical Tools



Note: Pretest application

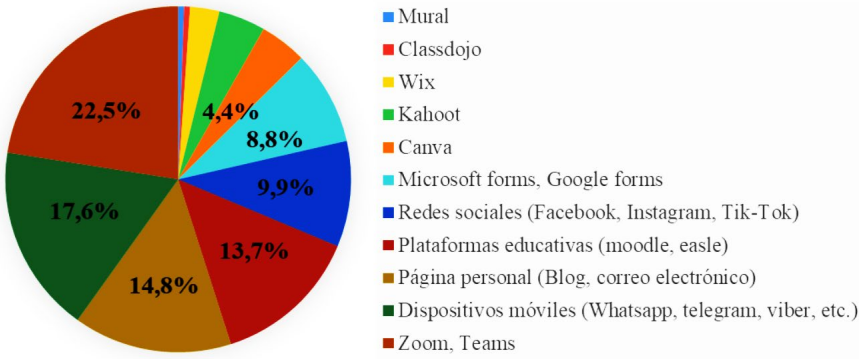
74% of respondents stated that they have knowledge of digital tools. However, possessing knowledge does not guarantee effective use or educational application. It is important to highlight that familiarity with these tools does not always translate into appropriate usage for pedagogical purposes (Manotoa, 2022).

It was interesting to observe that although 74% of respondents feel familiar with digital tools, this confidence does not necessarily result in effective use in educational settings. Simply having knowledge of technology does not ensure its appropriate application to enhance the teaching-learning process. This highlighted the need for continuous training and pedagogical strategies that integrate these tools effectively, ensuring that technology genuinely enhances education.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 2

Educational 3.0 Tools Used for Teaching.



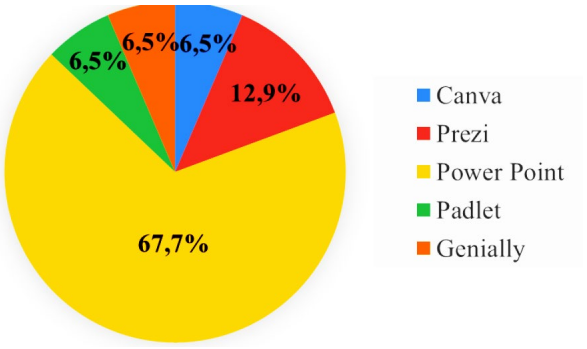
Note: Aplicación de pretest

Additionally, 54.9% indicated that the most frequently used educational 3.0 tools were Zoom, Teams, other mobile applications, and personal websites. This suggests that teachers primarily use technology for communication rather than for creating pedagogical resources, as tools like Prezi, Mural, or Quizziz allow. Furthermore, 55.8% reported that they often use online tools solely as communication channels for teaching, reinforcing the idea that they tend to rely on popular applications that are not necessarily pedagogically oriented and may not be suitable for creating educational materials (Manotoa, 2022).

The preference of 54.9% of teachers for tools like Zoom and Teams revealed a trend toward using technology mainly as a means of communication rather than leveraging its potential for creating pedagogical resources. This indicated that while these platforms are popular and effective for interaction, they are not being used to their full capacity to enrich educational content. It is essential to promote a shift in this mindset, encouraging the use of more pedagogy-oriented tools that facilitate the creation of innovative and effective teaching materials.

Figure 3

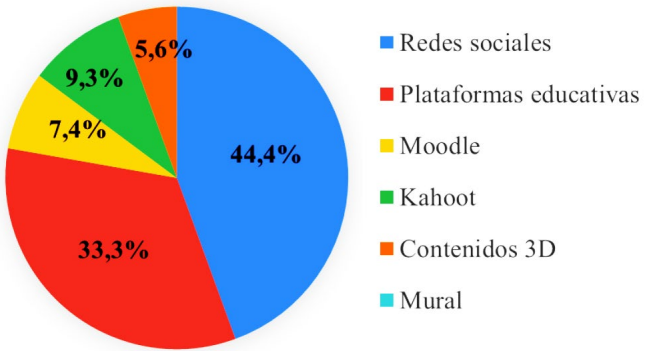
Educational 3.0 Tools Used for Teaching.



Note: Pretest application

Figure 4

Tools for Knowledge Consolidation.



Note: Pretest application

Regarding the tools used to present information, 67.7% stated that they use PowerPoint to display content or information about their subjects. This suggests that the traditional presentation method outweighs the didactic approach of generating interactive content through tools like Prezi or Genially.

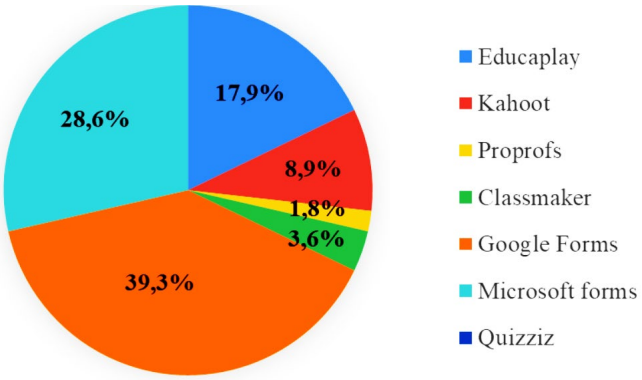
Approximately 44.4% of teachers primarily used direct communication tools, such as WhatsApp or Facebook, to reinforce the knowledge imparted. However, this reveals an urgent need to explore and adopt new, more interactive and learning-oriented digital pedagogical tools. Tools like Prezi, Mural, or Quizziz, for example, offer more dynamic and creative functionalities for the development of educational content (Manotoa, 2022).

The analysis revealed a tendency toward using traditional and direct communication tools in the educational field, indicating a preference for conventional methods, possibly due to their familiarity and ease of use. However, this trend also suggests an underutilization of more dynamic and interactive tools such as Prezi or Genially, which could enrich the learning experience and facilitate the creation of educational content.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 5

Herramientas para Evaluar los Aprendizajes.



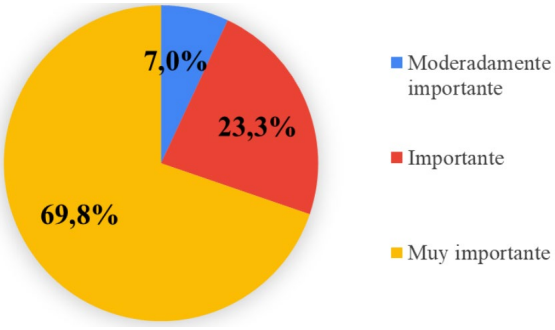
Note: Pretest application

Regarding the tools used for assessment, the study provided a clear view of the preferred evaluation tools, highlighting that 39.3% of respondents rely on online forms. The need to employ digital resources that facilitate more effective feedback was emphasized, mentioning Quizziz as a comprehensive and dynamic platform for assessment. However, it was noted that this tool is relatively unknown among the surveyed population. This suggests an opportunity to promote the use of more advanced and effective tools in the educational assessment process (Manotoa, 2022).

Most teachers in the study used online forms for evaluation, reflecting a preference for relatively basic methods. This trend underscores the need to adopt digital resources that offer more effective feedback. Although platforms like Quizziz stand out for their dynamic and comprehensive functionality for assessment, their limited familiarity among the studied population suggests an opportunity to promote their use. Integrating advanced and efficient tools like Quizziz could significantly enhance the educational assessment process by providing more interactive and detailed feedback.

Figure 6

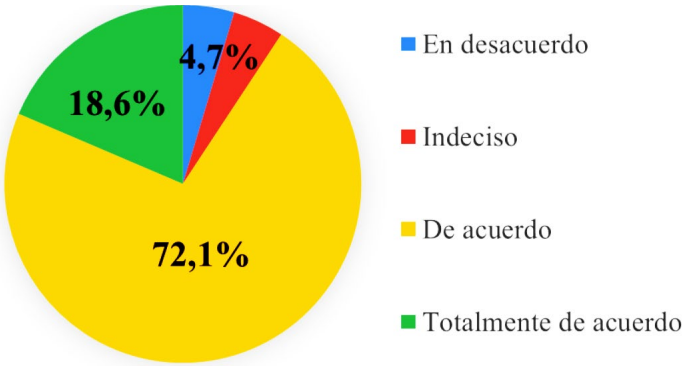
Importance of Using Web 3.0 Tools in Teaching.



Note: Pretest application

Figure 7

Resource Generation Using Web Tools.



Note: Pretest application

In response to the importance of using Web 3.0 tools in teaching, 93.1% recognized the relevance of planning virtual classes by leveraging the advantages of various online platforms and applications. It was mentioned that these tools are fundamental for presenting information, reinforcing knowledge, and evaluating content.

Additionally, 90.7% of the surveyed population considered it essential for teaching materials in virtual classes to be created by teachers themselves to ensure content personalization. The importance of the appropriate use of these resources was highlighted to foster student autonomy and collaboration (Manotoa, 2022).

It is encouraging to see that 93.1% of teachers recognize the importance of planning virtual classes by leveraging the advantages of various Web 3.0 tools. These platforms and online applications are fundamental for effectively presenting information, reinforcing knowledge, and assessing content in a virtual environment. Even more significant is that 90.7% of respondents consider it essential for virtual class materials to be created by teachers, ensuring content personalization and alignment with specific learning objectives. This underscores the importance of teachers mastering the appropriate use of these resources, thereby fostering student autonomy and collaboration in a technology-enhanced learning environment.

3.3. TAM Model Analysis

The Technology Acceptance Model (TAM) was used to draw conclusions from the experiment. This model “evaluates elements such as usefulness, ease of use, attitude, and intention to use new and innovative digital or technological resources” (Manotoa, 2022). A questionnaire was developed consisting of 16 Likert-scale items, as shown in *Table 2*.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Table 2

Alternatives and Assigned Values.

Alternative	Assigned Value
Strongly Disagree	A
Disagree	B
Neutral	C
Agree	D
Strongly Agree	E

Note: Extracted from Manotoa (2022) and Pimbo et al. (2023)..

Table 3

TAM Model Items

Instrument	
Factor: Perceived Usefulness (PU)	
ID	Statement
UTI1	The use of Web 3.0 tools allows me to complete my work more quickly.
UTI2	The use of Web 3.0 and gamification tools enables me to maintain a more friendly communication with my environment (classmates and teachers).
UTI6	I have felt satisfied when carrying out activities using Web 3.0 or gamification tools.
UTI8	I believe that the use of Web 3.0 digital tools supports learning.
Factor: Perceived Ease of Use (PEU)	
FAC1	Learning to use gamification and technological tools is easy for me.
FAC2	I find it easy to do what I want with the use of technology.
FAC8	I would like to use these types of tools more frequently in virtual classes.

Note: Extracted from Manotoa (2022) and Pimbo et al. (2023).

herramientas Web 3.0 y de gamificación facilita una comunicación más amigable entre los estudiantes y docentes, promoviendo un entorno de aprendizaje colaborativo e interactivo.

Table 4

Perceived Usefulness.

	Frecuencia					Porcentaje					TOTAL	
Alternativas Ítems	A	B	C	D	E	A	B	C	D	E	67	100%
UTI1	0	0	0	14	53	0,0	0,0	0,0	20,9	79,01		
UTI2	0	1	1	34	31	0,0	1,5	1,5	50.7	46,3		
UTI6	0	0	2	38	27	0,0	0,0	3,0	56,7	40,3		

UTI8	0	0	0	28	34	0,0	0,0	0,0	41,8	58,2

Note: TAM Model applied to teachers.

Based on *Table 4*, the results can be interpreted as follows for each item:

- UTI1: It was observed that 79.01% of the participants considered that the use of web 3.0 tools allows them to perform their work more quickly, suggesting a positive perception of the efficiency and usefulness of these tools in their roles as educators. This accelerates the execution of educational tasks in classes, collaborations with colleagues, and the development of lesson plans. According to Suárez et al. (2020), the use of web 3.0 tools provides teachers with greater flexibility and autonomy in their educational work, enabling them to focus on more valuable activities and improve the quality of their work. Additionally, they highlighted that these tools foster collaborative learning and...
- UTI2: con un 50,7% de respuestas afirmativas, se evidenció que el uso de Digital and Gamification Tools for Communication in the Workplace Context are Essential, as they simplify and make the technological educational work environment more enjoyable, indicating the importance of these technologies in improving interaction and collaboration. Zambrano et al. (2020) emphasized the importance of using gamification tools and digital resources to enhance interaction and collaboration in the classroom. These innovative technologies allow teachers to create interactive environments that promote self-regulated learning and student motivation, which in turn improves the quality of learning. Additionally, they facilitate communication and collaboration among students, which is beneficial for the development of social skills and teamwork..
- UTI6: 56.7% of the participants expressed satisfaction when carrying out their work and virtual classes using web resources, reflecting a considerable level of satisfaction with the use of these tools to conduct their tasks and virtual classes. According to Castro and Alanya (2024), the use of digital tools can enhance teachers' job satisfaction because it facilitates classroom management, communication with students, and learning assessment; this is because web tools provide greater flexibility and accessibility, making it easier to manage tasks and virtual classes.
- UTI8: With 58.2%, it was highlighted that participants considered the use of web tools in the virtual classroom environment to provide essential support for acquiring meaningful learning, emphasizing the importance of these technologies in teaching and training. These benefits cannot always be measured quantitatively, but they represent the foundational basis for knowledge development. Alarcón (2021) emphasized that the use of web tools in the teaching-learning process has several key benefits. First, it enhances the learning experience, enabling students to construct their learning more effectively. Moreover, it promotes inclusion and accessibility, as it allows learners to work at their own pace, which can be beneficial for those who need more time or who learn in different way.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Table 5

Perceived Ease of Use.

	Frecuencia					Porcentaje				TOTAL	
Alternativas Ítems	A	B	C	D	E	A	B	C	D	D	67	100%
FAC1	1	1	5	39	21	1,5	1,5	7,5	58,2	31,3		
FAC2	0	0	2	38	27	0,0	0,0	3,0	56,7	40,3		
FAC8	0	0	3	27	37	0,0	0,0	4,5	40,3	55,2		

Note. TAM Model Applied to Teachers

Based on *Table 5*, the results for each item were interpreted as follows:

- FAC1: The majority of participants (58.2%) agree that learning to use gamification and technological tools is easy for them. This suggests a general perception of ease in using these tools, which can be a positive indicator of familiarity and comfort with technology in this group. This perception is reinforced by the results of Heredia et al. (2020), who concluded that tools like Kahoot, Socrative, and Quizziz are easy to use due to their intuitive interface and easy access. Furthermore, teachers considered gamification a tool that is easy to implement and doesn't require much effort to learn how to use it. This suggests that the ease of use and access to these tools may be a positive indicator of the teachers' familiarity and comfort with technology, as they are willing to learn and use innovative tools to enhance their teaching.
- FAC2: Although 40.3% of participants agreed that they find it easy to do what they want with the use of technology; this figure is lower compared to FAC1. This indicates that there is a diversity of opinions regarding the ease of personalized use of technology, which may reflect varying levels of skill and technological experience among participants. Varona and Engel (2024) stated that digital technologies facilitate personalized learning and pointed out that although they are designed to be intuitive, their effective use varies according to the user's technological experience. Users with higher technological competence make better use of personalized tools, while those with less experience face more difficulties. Perceptions of ease of use and personalization depend on individual skill and experience, leading to diverse opinions about the effectiveness of these technologies in education.
- FAC8: el 55,2% of participants expressed their desire to use these tools more frequently in the virtual classroom. This majority response suggested an interest and positive willingness toward the integration and continued use of these tools in the educational environment, which could enhance innovation and the effectiveness of the educational process. According to Cevallos et al. (2020), the implementation of technological tools in the classroom generates great interest in using them even more in virtual classes, reflecting a positive attitude toward technology in education. This enthusiasm suggests that the ongoing integration of these tools could promote innovative and effective teaching methods, increasing student motivation and engagement. The regular adoption of digital

technologies is linked to higher participation and a proactive approach to learning, transforming the educational environment into a more dynamic and meaningful one.

In summary, the results showed a general tendency toward a positive perception and interest in the use of technological and gamification tools in the educational field, although there are variations regarding the perceived ease of personalized use. These findings support the importance and potential benefit of the continuous and effective use of these tools to improve the educational experience and promote more interactive and meaningful learning.

Conclusions

The COVID-19 pandemic accelerated the need to incorporate digital tools and infopedagogical resources into education. However, a gap was identified between trained teachers and those who still need to acquire digital competencies. Therefore, teacher training in infopedagogical resources is essential to address current challenges and ensure quality education. Collaboration among governments, educational institutions, and international organizations is crucial to closing existing gaps and preparing educators for the future of teaching.

After analyzing the results of the pretest applied to 43 teachers, it was evident that while most possess knowledge of Web 3.0 tools, their effective use is not guaranteed. It was highlighted that the most commonly used tools focus on communication, sidelining the creation of more interactive pedagogical resources. Additionally, the preference for traditional presentation methods, such as PowerPoint, suggests resistance to adopting more innovative approaches. Therefore, the adoption of more interactive, learning-oriented digital pedagogical tools is essential, particularly to strengthen assessment and effective feedback.

Based on the data collected after the experimentation phase, it was concluded that participants have a positive perception and high acceptance of the use of Web 3.0 tools, gamification, and digital technologies in their professional and educational environments. The efficiency, usefulness, and satisfaction provided by these tools were emphasized, as they accelerate educational tasks, enhance communication and collaboration, and support meaningful learning. Moreover, there was a perceived ease in using these technologies, along with a growing interest in their continuous integration into the educational setting.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

References

Alarcón, L. (2021). *Las herramientas digitales en el aula virtual de ELE: Un estudio sobre los desafíos didácticos en la implementación de herramientas digitales en el aula escolar sueca de los niveles A1-A2* [Tesis de grado, Universidad de Karlstad]. Repositorio Institucional de la Universidad de Karlstad: https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1593383&dswid=-6657

Álvarez, M. (2021). Recursos y materiales didácticos digitales. *Universidad de San Carlos de Guatemala*.

Allende (2021). GENIALLY, una herramienta para hacer presentaciones interactivas. *Creatividad.Cloud*. https://www.creatividad.cloud/genially-unaherramienta-para-hacer-presentaciones-interactivas/

Andrade, C., Siguenza, J., y Chitacapa, J. (2020). Capacitación docente y educación superior: propuesta de un modelo sistémico desde Ecuador. *Revista Espacios, 41*(33), 46-60. https://www.revistaespacios.com/a20v41n33/a20v41n33p05.pdf

Arana, I. (28 de mayo de 2021). Cuestionarios en Quizizz para tus clases. *Innovación Educativa*. https://innovacioneducativa.upc.edu.pe/?s=quizizz&post_type=post

Constitución de la República del Ecuador. 28 de septiembre de 2008 (Ecuador). https://www.defensa.gob.ec/wp-content/uploads/downloads/2021/02/Constitucion-de-la-Republica-del-Ecuador_act_ene-2021.pdf

Asamblea Nacional del Ecuador (2016). Ley Orgánica de Educación Intercultural.

Asamblea Nacional del Ecuador (2016). Ley Orgánica de Educación Superior.

Bonilla, J. (2020). Las dos caras de la educación en el COVID-19. *CienciAmérica*, *9*(2), 89-98. https://cienciamerica.edu.ec/index.php/uti/article/view/294

Cabero Almenara, J. y Palacios, A. (2020). Marco Europeo de Competencia Digital Docente «DigCompEdu» y cuestionario «DigCompEdu Check-In». *EDMETIC, , 9*(1), 213-234. doi: https://doi.org/10.21071/edmetic.v9i1.12462

Cabero Almenara, J., Barroso, J., Llorente, C., y Palacios, A. (2022). Validación del Marco Europeo de Competencia Digital Docente mediante ecuaciones estructurales*, Revista Mexicana de Investigación Educativa, 27* (92). https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-66662022000100185

Camacho, J. (2021). El teletrabajo, la utilidad digital por la pandemia del COVID-19. *Revista Latinoamericana de Derecho Social*, *1*(32), 125–155. https://revistas.juridicas.unam.mx/index.php/derecho-social/article/view/15312

Castro, L. y Alanya, E. (2024). Herramientas digitales en el desempeño de los docentes: revisión sistemática. *Horizontes, 8*(32), 288–299. https://revistahorizontes.org/index.php/revistahorizontes/article/view/1327

Casarotto, C. (2021). Zoom: la guía sobre cómo realizar una reunión de videoconferencia. *Rockcontent*. https://rockcontent.com/es/blog/zoom/

Cevallos, J., Lucas, X., Paredes, J., y Tomalá, J. (2020). Uso de herramientas tecnológicas en el aula para generar motivación en estudiantes del noveno de básica de las unidades educativas Walt Whitman, Salinas y Simón Bolívar, Ecuador. *Revista Ciencias Pedagógicas e Innovación*, *7*(2), 86-93. https://sga.uteq.edu.ec/media/evidenciasiv/2023/09/15/evidencia_articulo_2023915122641.pdf

Chavero, A. (18 de febrero de 2021*).* ¿Qué es Kahoot? ¡Juega y crea tu primer Kahoot! *Crehana*. https://www.crehana.com/blog/transformacion-digital/que-es-kahoot/

Fondo de las Naciones Unidas para la Infancia (2020). Plan de respuesta humanitaria COVID-19. *UNICEF*.

El Telégrafo (15 de enero de 2021). *La educación es el camino*. *El Telégrafo.* https://www.eltelegrafo.com.ec/noticias/editoriales/1/educacion-es-el-caminounicef

García, O., Zaldívar, A., y Peña, G. (2022). Formación docente en competencias TIC. RIDE. *Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, *13*(25), 66-80. https://www.ride.org.mx/index.php/RIDE/article/view/1370

González, M. (2021). La capacitación docente para una educación remota de emergencia por la pandemia de la COVID-19. *Tecnología, Ciencia y Educación*, (19), 81-102. https://doi.org/10.51302/tce.2021.614

Hernández, V. (2018). Genial.ly para crear recursos educativos. *E-Learning Masters*. http://elearningmasters.galileo.edu/2018/10/03/conoces-la-herramienta-genially-para-crear-recursos-educativos/

Heredia, B., Pérez, D., Cocón, J., y Zavaleta, P. (2020). La Gamificación como Herramienta Tecnológica para el Aprendizaje en la Educación Superior. *Revista Docentes 2.0, 9*(2), 49-58. https://ojs.docentes20.com/index.php/revista-docentes20/article/view/144

Inclán, C. (2021). Formar docentes para un mundo mejor. Un estudio comparado de seis programas de formación docente para educar para el siglo XXI. *Revista Mexicana de Investigación Educativa*, *26*(89). https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-66662021000200561

Manotoa, H. (2022). *La Capacitación Docente Basado en Recursos Infopedagógicos para un Aprendizaje Significativo en el Nivel de Bachillerato* [Tesis de posgrado, Universidad Técnica de Ambato]. Repositorio institucional de la Universidad Técnica de Ambato: https://repositorio.uta.edu.ec/handle/123456789/35451

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Ministerio de Educación (2020). ACUERDO Nro. MINEDUC-MINEDUC-2020-00014-A. 15 de marzo de 2020. https://educacion.gob.ec/wp-content/uploads/downloads/2020/04/MINEDUC-MINEDUC-2020-00014-A.pdf

Ministerio de Educación. (2020). Plan Educativo Covid-19 se presentó el 16 de marzo. 16 de marzo de 2020.

Ministerio de Educación (20 de marzo de 2020). Plan Educativo COVID 19. *Ministerio de Educación.* https://educacion.gob.ec/plan-educativo-covid-19/

Ministerio de Educación (2021). Nuestros cursos. *Ministerio de Educación.*

Ministerio de Educación y Formación Profesional y Administraciones educativas de las comunidades autónomas (2022). Marco de Referencia de la Competencia Digital. https://intef.es/wp-content/uploads/2023/05/MRCDD_GTTA_2022.pdf

Ministerio del Trabajo (2020). Directrices para la aplicación del teletrabajo en el código del trabajo. 27 de octubre de 2020. Registro Oficial 318. https://www.finanzaspopulares.gob.ec/wp-content/uploads/2020/11/directrices_teletrabajo.pdf

Naciones Unidas (1 de junio de 2020). ¿Ha llegado el teletrabajo para quedarse? Cómo el coronavirus puede cambiar el futuro del trabajo. *Noticias ONU*. https://news.un.org/es/story/2020/06/1475242

NU. CEPAL - UNESCO (2020). *La educación en tiempos de la pandemia de COVID-19*. UNESCO. https://www.cepal.org/es/publicaciones/45904-la-educacion-tiempos-la-pandemia-covid-19

Naranjo, M. (9 de abril de 2021). Google Forms: qué es, cómo funciona y para qué sirve. *AZadslzone*. https://www.adslzone.net/como-se-hace/google/crear-formulariogoogle/

Nieva, J., y Martínez, O. (2016). Una nueva mirada sobre la formación docente. *Universidad y Sociedad, 8*(4). http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S2218-36202016000400002

Pérez, M. (2017). Declaración de UNESCO en Grunwald. *Comunicar, 15*(28), 122-125. https://www.redalyc.org/pdf/158/15802816.pdf

Pimbo, A., Manotoa, H., Medina, R., y Morocho, H. (2023). Tecnologías del Aprendizaje y el Conocimiento: análisis de aceptación de implementación basado en el Modelo TAM. *ODIGOS*, *4*(1), 89–110. https://doi.org/10.35290/ro.v4n1.2023.752

Pinto, G. y Plaza, J. (2020). Determinar la necesidad de capacitación en el uso de las tecnologías de la información y las comunicaciones para la formación docente. *593 digital Publisher CEIT*, *6*(1), 169–181. https://dialnet.unirioja.es/servlet/articulo?codigo=7897553

Ramírez, J., Quinde, L., Alarcón, R., y Vega, C. (2021). Teletrabajo en tiempos de pandemia: Un reto laboral en la educación superior. *Revista Scientific, 6*(20), 130-151. https://doi.org/10.29394/Scientific.issn.2542-2987.2021.6.20.7.130-151

Rodríguez, M. (2021). Necesidades docentes durante la pandemia por COVID-19 en educación remota de emergencia. *Revista de estudios y experiencias en educación*, *21*(47), 185-199. https://www.redalyc.org/journal/2431/243173717011/html/

Salas, M., Salas, M., y Hernández, J.(2022). Las competencias digitales y sus componentes clave para mejorar el trabajo académico de estudiantes y docentes. *Ciencia Latina, 6*(6), 5834-5865. https://doi.org/10.37811/cl_rcm.v6i6.3846

Serrano, I. (2021). Qué es Microsoft Teams: para qué sirve, modalidades y precios. *AZadslzone*. https://www.adslzone.net/reportajes/software/microsoft-teamsque-es/

Suárez, Y., Rincón, R., y Niño, J. (2020). Aplicación de herramientas web 3.0 para el desarrollo de competencias investigativas en estudiantes de educación media. *Pensamiento y Acción,* (29), 3-20. https://www.researchgate.net/publication/349261903_Aplicacion_de_herramientas_web_30_para_el_desarrollo_de_competencias_investigativas_en_estudiantes_de_educacion_media

Torres, D. (2021). Los mejores 30 programas para videoconferencias en 2022. *HubSpot.* https://blog.hubspot.es/sales/programas-videoconferencias

UNADE (4 de febrero de 2021). Qué es Kahoot y sus beneficios en el aprendizaje. *Universidad Americana de Europa*. https://unade.edu.mx/que-es-kahoot/

UNESCO (2018). Competencias Para Un Mundo Conectado. https://es.unesco.org/sites/default/files/unesco-mlw2018-concept-note-es.pdf

UNESCO (2021). *When schools shut. Gendered impacts of COVID-19 school closures.* UNESCO.

UNESCO (2020). *Hoja informativa sobre el Día Mundial de los Docentes 2020* [hoja informativa]. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000374450_spa

Unidad Educativa Pompeya (2021). Reseña Histórica. *Unidad Educativa Pompeya.* https://www.uenspompeya.online/

Universidad Latina de Costa Rica (9 de julio de 2019). Qué son las TIC y para qué sirven. Universidad Latina de Costa Rica. https://www.ulatina.ac.cr/blog/qu3-son-las-tic-y-para-que-sirven

Universidad Nebrija (2018). ¿Qué es Prezi y para qué sirve? | Formación online homolologada APPF. *APPF.Es.*

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Vargas, G. (2019). Competencias digitales y su integración con herramientas tecnológicas en educación superior. *Cuadernos Hospital de Clínicas, 60*(1). http://www.scielo.org.bo/scielo.php?script=sci_arttext&pid=S1652-67762019000100013

Varguillas, C. y Bravo, P. (2020). Virtualidad como herramienta de apoyo a la presencialidad. *Revista de Ciencias Sociales*, 26(1), 219–232. https://dialnet.unirioja.es/servlet/articulo?codigo=7384416

Varona, S. y Engel, A. (2024). Prácticas de personalización del aprendizaje mediadas por las tecnologías digitales: una revisión sistemática. *Edutec Revista Electrónica de Tecnología Educativa* (87), 236-250. https://www.researchgate.net/publication/379173419_Practicas_de_personalizacion_del_aprendizaje_mediadas_por_las_tecnologias_digitales_una_revision_sistematica

Zambrano, A., Lucas, M., Luque, K., y Lucas, A. (2020). La Gamificación: herramientas innovadoras para promover el aprendizaje autorregulado. *Revista de Dominio de las Ciencias, 6*(3), 349-369. https://dominiodelasciencias.com/ojs/index.php/es/article/view/1402/2501

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1237 • e-ISSN: 2631 - 2786

Educational management and soft skills in technological higher institutes: A systematic review

Gestión educativa y habilidades blandas en institutos superiores tecnológicos: Revisión sistemática

Date of receipt: 2024-03-04 • Date of acceptance: 2024-09-11 • Published: 2025-01-10

Augusto Fernando Hermoza Caldas [1]
Universidad César Vallejo, Perú
marikrishnab@gmail.com
https://orcid.org/0000-0003-0693-1319

Jannet Fuster Gómez [2]
Universidad César Vallejo, Perú
jfustergo@ucvvirtual.edu.pe
https://orcid.org/0009-0002-5975-0602

Luis Romero Echevarría [3]
Universidad Nacional Tecnológica de Lima Sur, Perú
lromeroe@untels.edu.pe
https://orcid.org/0009-0005-3145-0842

Abstract

The general objective of this research was to identify and analyze the most relevant and recent studies that address educational management and soft skills in a technological higher institute (TGI). Methodologically it was approached from the principles of the PRISMA declaration. The following inclusion criteria were applied for the selection of documents: a) original and review scientific articles, b) published in the period 2013 to 2023, c) disseminated in Spanish or English, d) with open access; and those of exclusion: a) opinion articles, blogs, editorials and theses, b) outside the established range, c) in a language other than English or Spanish and d) studies with restricted access. The results of the search and application of the inclusion and exclusion criteria allowed to recognize 30 works that were analyzed from a quantitative perspective. It is concluded that educational management and soft skills play a fundamental role in the integral development of students of a TGI, evidencing the relevance of promoting the formation of socio-emotional competencies and transversal skills together with technical knowledge, since this contributes to prepare students to face the challenges of the working world and promote their professional success.

Keywords: teaching center management, skill, institute, curriculum development, learning process

Resumen

La presente investigación tuvo como objetivo general identificar los estudios más relevantes y recientes que aborden la gestión educativa y habilidades blandas en un instituto superior tecnológico (IST). Metodológicamente se abordó desde los principios de la declaración PRISMA. Para la selección de documentos se aplicaron los siguientes criterios de inclusión: a) artículos científicos originales y de revisión, b) publicados en el período 2013 al 2023, c) divulgados en idioma español o inglés, d) con acceso abierto; y los de exclusión: a) artículos de opinión, blogs, editoriales y tesis, b) fuera del rango establecido, c) en idioma diferente al inglés o español y d) estudios con acceso restringido. Los resultados de la búsqueda y aplicación de los criterios de inclusión y exclusión permitieron reconocer 30 trabajos que fueron analizados desde una perspectiva cuantitativa. Se concluyó que la gestión educativa y las habilidades blandas desempeñan un papel fundamental en el desarrollo integral de los estudiantes de un IST, evidenciando la relevancia de promover la formación de competencias socioemocionales y habilidades transversales en conjunto con los conocimientos técnicos, ya que esto contribuye a preparar a los estudiantes para enfrentar los retos del mundo laboral y fomentar su éxito profesional.

Palabras clave: gestión del centro de enseñanza, habilidad, instituto, desarrollo del currículum, proceso de aprendizaje

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

Education, as a fundamental pillar in human and social development, plays a crucial role in preparing individuals to face the challenges of the 21st century. In this context, Educational Management (EM) stands out as a key discipline that seeks to ensure the quality and effectiveness of the educational process (Chamorro, 2023). Through strategic planning, resource organization, and the management of teaching and learning processes, EM aims to guarantee comprehensive education that fosters the development of skills and competencies necessary for success in personal, professional, and social life. In this regard, it has become imperative to highlight the relevance of integrating Soft Skills (SS) or socio-emotional skills within the framework of EM, recognizing that these personal abilities not only complement technical knowledge but also enhance students' overall growth and their ability to adapt in a constantly changing work and social environment.

In the educational field, EM refers to the planning, organization, and management of resources and processes involved in teaching and learning. Its main objective is to ensure educational quality by promoting the holistic development of students and the efficiency of academic outcomes. It encompasses various aspects such as curriculum design, the selection of pedagogical methods, teacher training, and learning assessment (Araya & Garita, 2019). In this context, SS or socio-emotional skills have gained significant importance in education. These skills, also known as non-technical skills or transversal competencies, refer to personal abilities that go beyond specific disciplinary knowledge. They include skills such as effective communication, teamwork, problem-solving, empathy, critical thinking, and adaptability to change, among others (Montes, 2019).

SS are fundamental to students' comprehensive development, as they enable them to effectively face challenges in both the workplace and society. Although technical and specialized knowledge is important, SS complement and enhance these competencies, facilitating interactions with others, decision-making, conflict resolution, and leadership (Muñoz Iparraguirre et al., 2021).

EM and the development of SS have become essential aspects of education, especially in a Technological Higher Institute (IST). Today, the educational system faces the challenge of preparing students not only with technical and specialized knowledge but also with socio-emotional competencies that allow them to function effectively in work and social environments (Avelino, 2022).

In this regard, EM plays a crucial role in establishing policies and strategies that promote the acquisition and development of SS (Lozano et al., 2022). This involves creating appropriate learning spaces, implementing innovative pedagogical methodologies, encouraging active student participation, and continuously evaluating their progress in these competencies. Likewise, EM must ensure the ongoing training of teaching staff, providing them with opportunities for professional development in SS. Teachers, as role models and learning facilitators, play a fundamental role in fostering these competencies among students. Therefore, it is essential that they are well-prepared and up to date with best teaching practices that promote SS development in the classroom (Rodríguez Siu et al., 2021). Furthermore, collaboration and networking with other ISTs, educational

institutions, and industry organizations should be encouraged. Such collaboration facilitates the exchange of experiences, best practices, and resources to strengthen the implementation of programs and projects that foster SS development in students.

Thus, EM in an IST must aim to develop a comprehensive training approach that combines technical knowledge with the SS required for success in the workplace. This involves designing pedagogical strategies that encourage the development of these skills, as well as providing opportunities for practice and assessment (Araya & Garita, 2019). In an IST, where programs focus on technical and technological fields, EM must consider integrating SS into the curriculum and student training. This is because companies and organizations increasingly demand professionals who not only possess technical knowledge but also skills such as teamwork, effective communication, and adaptability to technological changes, among others. Therefore, institutes must adapt to this demand and provide students with the necessary tools to excel in the job market (Montes, 2019).

For this reason, Rodríguez Siu et al. (2021) emphasized the importance of EM in promoting and developing SS in an IST. Meanwhile, Zepeda et al. (2019) specifically addressed the implementation of innovative pedagogical strategies that foster SS development in technological settings. Consequently, in recent years, various studies have been conducted on this topic, highlighting the importance of integrating EM and SS in an IST. For example, the study by Palma et al. (2022) demonstrated that efficient EM focused on SS development contributes to strengthening self-confidence, effective communication, and problem-solving.

Given the above, it is important to emphasize that efficient EM, centered on promoting SS, creates a conducive environment for the comprehensive development of IST students, providing them with the opportunity to acquire socio-emotional competencies essential for excelling in a constantly changing work and social environment (Hernández & Neri, 2020). However, despite the significance of EM and SS, there is a lack of systematic studies on the subject. Therefore, conducting a systematic review to analyze the most relevant studies is justified, as it will allow for synthesizing the available evidence, providing useful information for researchers and other stakeholders, and facilitating the identification of best practices and recommendations to strengthen EM and SS development in an IST, thus closing the existing knowledge gap and guiding future research.

The need for adaptation and the growing demand for SS alongside technical knowledge reflect the central problem of this research. Questioning the current progress and perspectives on the integration of EM and SS in an IST has been the starting point for understanding the objective of this study. In this context, the analysis of the most relevant studies addressing EM and SS in an IST was proposed.

Methodology

A systematic review approach was chosen for the design and development of this research. This process is carried out to identify key aspects of a literature review relevant to practice. It involved searching for and extracting relevant information based on criteria that have been evaluated and established by other experts in the field. To conduct this research, the guidelines established in

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

the PRISMA statement were followed. These guidelines provided a methodological and reporting framework to conduct a systematic review in a rigorous and transparent manner.

In this regard, the proposals put forth by researchers such as Rosales and Marcano (2023) were considered, as they emphasized the importance of following a set of rules in the development of systematic reviews to ensure the scientific quality of the work. These rules included the precise delimitation of the research question and objectives, which made it possible to conduct a critical evaluation of the collected material, allowing for a thorough analysis. Following these guidelines, a rigorous and structured approach to the systematic review process was ensured. Therefore, an exhaustive collection of information was carried out through a meticulous search in databases, which were defined as interconnected repositories of data storing relevant information to meet the informational needs of a specific user community. For this purpose, relevant scientific articles were used as sources for the search. To optimize the search, keywords and Boolean operators were employed in formulating the queries, such as “Educational Management” AND “Soft Skills” AND “Technological Higher Institute” or “Educational Management” AND “Promotion of Soft Skills” AND “Higher Technical Education.”

The identification and consultation of articles were conducted following the systematic review approach, which involves searching, analyzing, selecting, and comparing bibliographic references published in indexed journals. In this way, the steps corresponding to this method were applied to ensure the comprehensiveness and quality of the information collection for this study. Accordingly:

1. A thorough search for academic articles on Educational Management and Soft Skills in a Technological Higher Institute (IST) was conducted using databases such as Scopus, SciELO, Redalyc, Google Scholar, Latindex, and Dialnet.
2. Inclusion and exclusion criteria were applied to select the most relevant studies, as follows:

Inclusion criteria:

a. Original scientific and review articles,
b. Published between 2013 and 2023,
c. Written in Spanish or English,
d. Open-access studies.

Exclusion criteria:

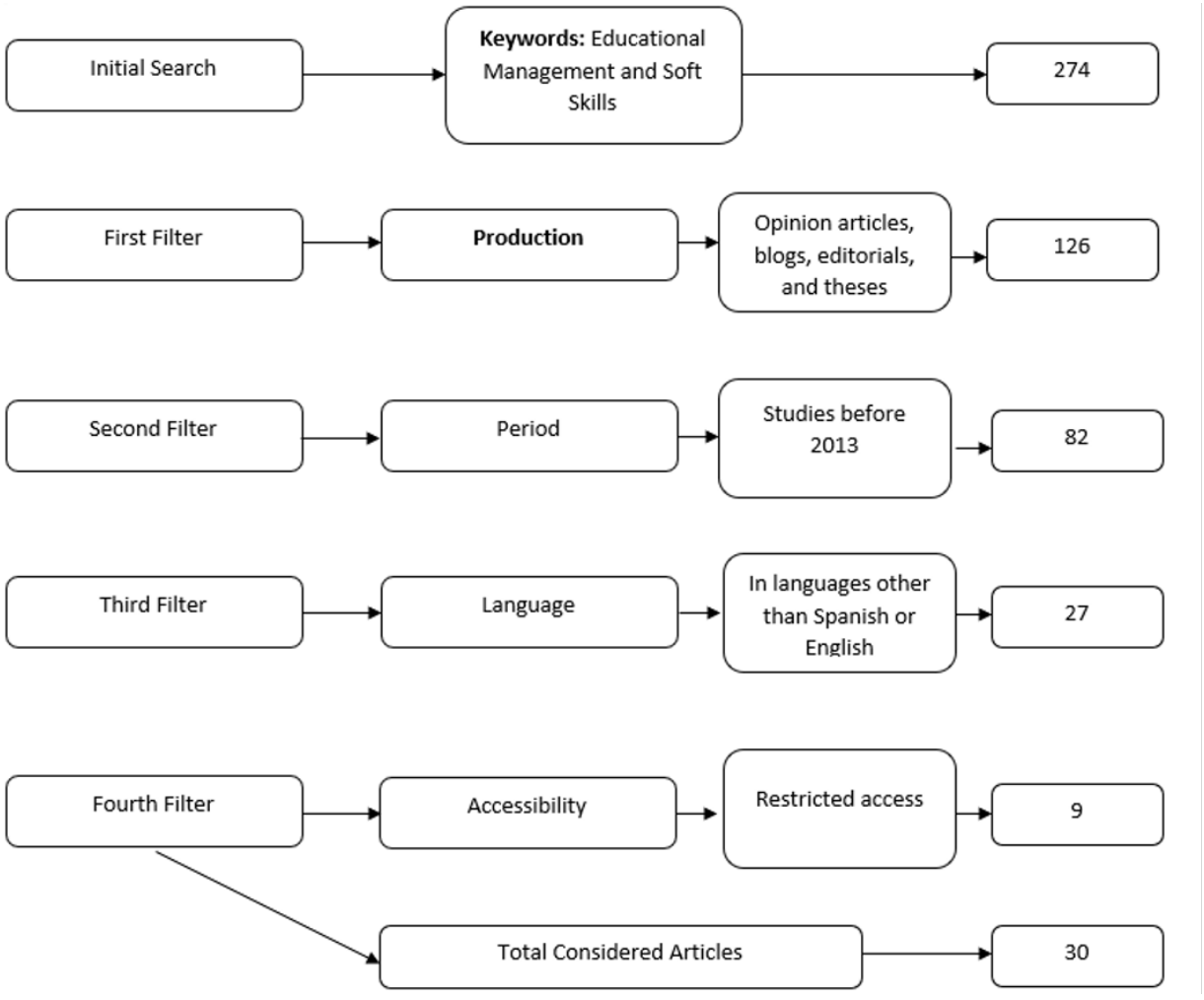
a. Opinion articles, blogs, editorials, and theses,
b. Studies outside the established timeframe,
c. Studies in languages other than English or Spanish,
d. Studies with restricted access.

3. The results and conclusions derived from the systematic literature review were developed.

Finally, 274 references were identified from various sources, allowing for the selection of 30 studies according to the defined criteria. *Figure 1* presents the key findings related to Educational Management (EM) and Soft Skills (SS) in a Technological Higher Institute (IST), detailing the inclusion and exclusion criteria used. After gathering the information, inclusion and exclusion criteria were applied, initially discarding opinion articles, blogs, editorials, and theses. Then, the criteria were refined to exclude studies published before 2013 and those written in languages other than Spanish or English. Lastly, research with restricted access was excluded, which ultimately led to the identification of 30 documents for the study.

Figure 1

PRISMA Flow Diagram.



e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Table 1

Synthesis Matrix.

Author/Year	Title	Type of Research	Country
Passaillaigue et al. (2023)	Knowledge Management and Organizational Learning in Higher Education Institutions	Literature Review	Ecuador
Gaitán et al. (2023)	Analysis of Soft Skills in Business Administration, Marketing, and Advertising Programs. Catholic University Redemptoris Mater in Managua, Nicaragua	Quantitative-Descriptive	Puerto Rico
Becker et al. (2023)	Internationalization Policies in Higher Education Institutions. Case Study: DHIP Project	Literature Review	Paraguay
Olmedo et al. (2023)	Generic Competencies or Soft Skills in Higher Education	Mixed Methods	Ecuador
Chamorro (2023)	From Business to School: Reconstructing Knowledge Management in the Educational Field	Literature Review	Costa Rica
Plasencia et al. (2022)	Managerial Competencies and Change Management in Public Technological Higher Education Institutes	Quantitative-Correlational	Peru
Monzón et al. (2022)	Neuromanagement and Social Responsibility: Key Factors in University Educational Management	Quantitative-Correlational	Peru
Maluenda (2022)	Strengths and Weaknesses in the Human Capital Perspective in Higher Education Institutions	Literature Review	Chile
Lozano Fernández et al. (2022)	Soft Skills as a Key to Providing Quality Education: Theoretical Review	Literature Review	Peru
Vázquez et al. (2022)	Study on Soft Skills in University Students: The Case of TECNM Coatzacoalcos	Quantitative-Descriptive	Mexico
Palma et al. (2022)	Educational Management and Neuroleadership in High School Level in Manabí	Quantitative-Correlational	Ecuador
Romero (2022)	Scope and Challenges of Institutional Management in the 2020-2021 Period	Literature Review	Peru
Velez (2022)	Educational Management Model for Achieving Meaningful Learning in Nursing Students at a University in Chiclayo	Quantitative-Descriptive	Peru
Avelino (2022)	Importance of Soft Skills and Their Relationship with Organizational Climate in Teachers of Educational Institutions	Literature Review	Ecuador
López et al. (2022)	Analysis of Administrative Management in the Local Educational Management Unit No. 302, Leoncio Prado	Quantitative-Descriptive	Peru
Ramos (2022)	Most Valued Managerial Competencies in Directors of Public Educational Institutions, Lima 2021: Innovation in Educational Management	Basic-Descriptive	Peru
Muñoz Iparraguirre et al. (2021)	Improvement Strategy for Leadership and Managerial Skills in Higher Education	Mixed Methods	Peru
Portocarrero et al. (2021)	Educational Management for Academic Sustainability in Colombia	Quantitative-Descriptive	Colombia
Marcone et al. (2020)	Self-Perception of Creativity and Innovation Competencies in University Students in Health Sciences: Development Factors	Quantitative-Descriptive	Chile
Rodríguez Siu (2020)	Soft Skills as the Basis for Good Performance of University Professors	Quantitative-Correlational	Peru

Muñoz Maldonado & Sánchez (2020)	Organizational Learning in a Higher Technological Education Institute in Callao	Qualitative-Hermeneutic	Peru
Moreno et al. (2020)	Understanding and Developing Soft Skills in Higher Education Institutions: A Faculty Perspective	Qualitative-Hermeneutic	Colombia
Rueda et al. (2020)	Training in General Labor Competencies: A Challenge for Higher Education	Literature Review	Colombia
Hernández et al. (2020)	Soft Skills in Engineering Students from Three Public Higher Education Institutions	Quantitative-Descriptive	Mexico
Espinoza et al. (2020)	Soft Skills in Education and Business: Systematic Mapping	Literature Review	Ecuador
Guerra (2019)	A Panoramic Review of Soft Skills Training in University Students	Literature Review	Colombia
Montes (2019)	Soft Skills in University Students and Employability in Costa Rica	Literature Review	Costa Rica
Araya et al. (2019)	Proposal for Strengthening Technical, Soft, and Complementary Skills and Their Impact on the ICT Curriculum from a Labor, Professional, and Academic Management Perspective	Mixed Methods	Costa Rica
Zepeda et al. (2019)	The Development of Soft Skills in Engineering Education	Literature Review	Mexico
Carrillo et al. (2018)	Citizenship Competencies in Professional Training in the Cities of Concepción (Chile) and Barcelona (Spain)	Case Study	Chile

It is important to highlight that, although the systematic review sought studies that specifically addressed GE and HB jointly, there was a scarcity of research integrating both variables. However, a close relationship between GE and the development of HB was evident, as both areas are fundamental to the educational and professional success of students in an IST. Therefore, although most of the reviewed studies focus on only one variable separately, their contribution is considered valid and relevant, as they help to understand crucial aspects related to GE and the promotion of HB in this educational context. Through the systematic review, the aim was to identify and analyze the available evidence in each of these areas, providing valuable knowledge for improving training in an IST.

3.1. Publications by Year of Production.

This section presents the findings corresponding to each of the retrieved and reviewed studies, organized according to the year they were published, as shown in *Figure 2*.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 2

Frequency of Studies by Year of Production.

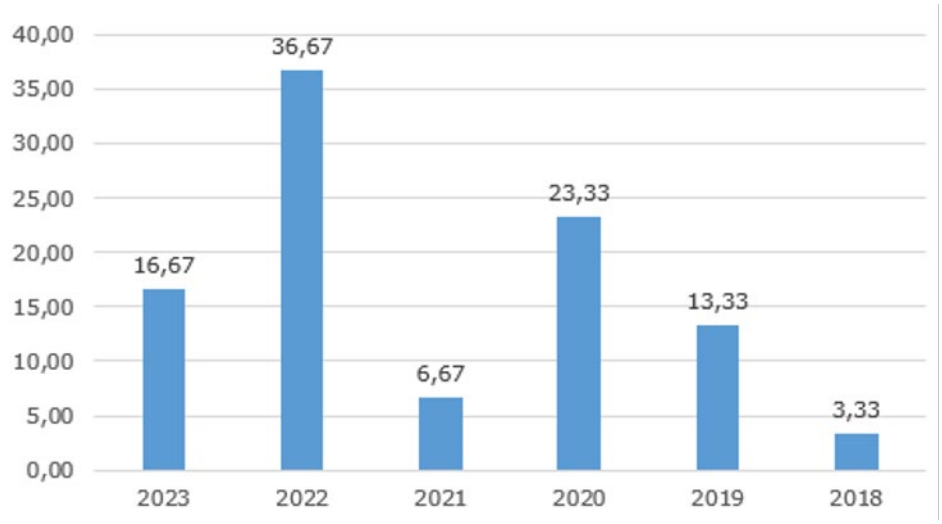


Figure 2 showed that most of the reviewed articles were published in 2022, accounting for 36.67% (11 documents), followed by 23.33% (7 documents) in 2020. In 2023, 16.67% (5 documents) were found, while in 2019, the frequency was 13.33% (4 documents). In 2021, the frequency was 6.67% (2 documents), and finally, in 2018, a concentration of 3.33% (1 document) was observed.

This trend may be attributed primarily to the growing interest in GE and HB in an IST in recent years. This approach has become increasingly relevant in the current context, where the importance of combining technical knowledge with socio-emotional skills for a comprehensive education is recognized. In this regard, it is worth highlighting Avelino (2022), who emphasized the need to develop pedagogical strategies that promote the development of HB in educational settings. Furthermore, the evolution of research in the field of GE and HB has also been a factor influencing the observed trend. Velez (2022) demonstrated the importance of efficient GE focused on fostering HB to strengthen self-confidence, effective communication, and problem-solving skills. These studies have contributed to generating greater interest in integrating these two variables in an IST.

It is also necessary to consider the relevance of current contexts and challenges faced by an IST, where the impact of implementing HB development programs on students' academic performance and employability has been analyzed. This highlights the need to incorporate these skills into the curriculum and improve educational proposals, as noted by Chamorro (2023). In an ever-evolving professional and social environment, HB has become essential for students' academic and professional success. This increased awareness has led to a rise in research and knowledge generation on the integration of GE and HB in this specific context.

It is important to note that the lack of studies prior to 2018 may be attributed to a scarcity of published research on the integration of GE and HB in an IST during that period. It is possible that in previous years, the educational focus in these institutions was primarily on transmitting technical knowledge, overlooking HB development. This may have influenced research and academic

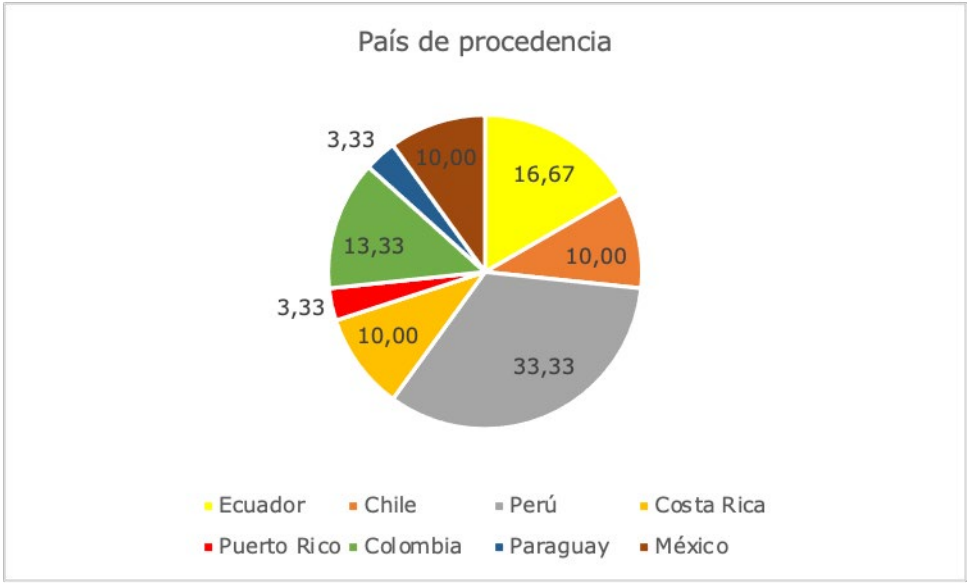
attention to be directed more towards other aspects of technological education. It is significant to note that from 2018 onwards, there has been a concentration of articles, suggesting a growing interest and research related to these two variables.

3.2. Publicaciones por país de procedencia

It was essential to recognize the trend regarding the country of origin of the retrieved and analyzed publications, which was presented in *Figure 3*.

Figure 3

Publications by Country of Origin.



According to *Figure 3*, it was verified that the country with the highest frequency of publications related to the study variables is Peru, with 33.33% (10 documents) of the articles retrieved and analyzed in this review, followed by Ecuador and Colombia with 16.67% and 13.33%, respectively (5 and 4 documents each). Next, Chile, Mexico, and Costa Rica account for 30% (10% each) with 3 publications per country, and finally, Paraguay and Puerto Rico each contribute 6.66% (1 document per country).

Based on these results, it was verified that 100% of the retrieved studies came from Latin American countries, which may be due to shared socio-cultural and educational contexts, creating a need to specifically investigate and address the challenges and opportunities related to GE and HB in an IST. This explanation is supported by the research of Rueda and Portilla (2020), who pointed out that the region has a growing recognition of the importance of developing HB in both the educational and professional fields, due to the necessity of training competent professionals who can adapt to a constantly changing job market and the unique socioeconomic challenges faced by Latin America.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Additionally, many Latin American countries are increasingly recognizing the importance of HB in both education and employment. Technological higher education institutes are seeking ways to strengthen their students' training in these skills to enhance their employability and success in the workforce. As Maluenda (2022) stated, Latin America has faced specific socioeconomic and labor challenges that require a comprehensive education for students. This includes not only technical knowledge but also HB such as teamwork, effective communication, and critical thinking, among others. This is due to the growing demand for professionals who can adapt to changing work environments and collaborate in multidisciplinary teams.

Moreover, it is important to mention that many Latin American countries have implemented policies and educational programs aimed at strengthening HB training. In Peru, for example, efforts have been made to include these skills in the curriculum and develop teacher training programs in this area (Ramos, 2022). This institutional attention and support may have contributed to a greater volume of research in this country.

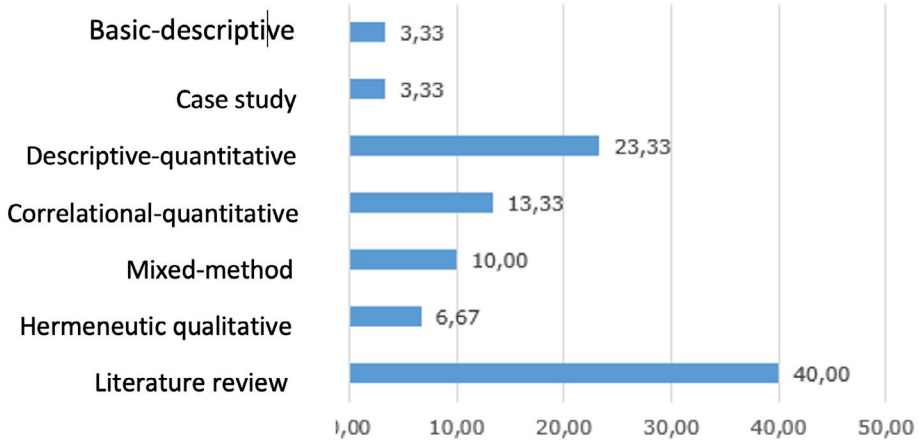
These observations confirm that the analyzed documents focused on understanding how GE fosters the development of HB in an IST. This topic has gained significant importance in the Latin American region, where the need to promote the comprehensive growth of students—strengthening both their technical knowledge and socio-emotional skills—is widely recognized. Espinoza and Gallegos (2020) highlighted the importance of this integration and its impact on the training of competent professionals who are well-adapted to workplace demands.

It is important to note that each Latin American country may have its own perspective and approach regarding GE and HB, as educational contexts and policies may vary. However, in general, the trend towards integrating these two variables in technological higher education institutes is due to the recognized importance of HB in students' holistic development and their preparation for the workforce.

3.3 Publications by Type of Research.

Figure 4

Publications by Type of Research.



As shown in *Figure 4*, among the reviewed studies in this research, 40% corresponded to literature reviews, accounting for 12 publications. In second place, descriptive quantitative studies were found at 23.33% (7 studies), followed by correlational quantitative studies, representing 13.33% (4 documents). Mixed-method studies accounted for 10% (3 studies), and hermeneutic studies represented 6.67% (2 studies). Finally, case studies and basic descriptive studies had one publication each, making up the remaining 6.66%.

The prevalence of literature review research may be related to the need for a comprehensive and updated overview of the integration of GE and HB in an IST. According to Guirao (2015), these types of reviews allow for the analysis and synthesis of existing knowledge in a specific area, providing a solid foundation for understanding the relationships between different aspects involved. For this reason, the analysis of documents and secondary sources can be a useful strategy for exploring various facets of these variables, as it offers valuable insights into the benefits, challenges, and recommendations associated with GE and HB in the context of an IST.

On the other hand, the presence of descriptive quantitative studies may be attributed to the need for empirical and objective data regarding the relationship between GE and HB. These studies help collect quantitative data that offer a precise understanding of the studied phenomena, providing solid evidence to support reliable conclusions. Similarly, correlational quantitative studies explored the relationships between variables and helped identify possible associations between GE and HB development (Arias et al., 2020).

Regarding mixed-method studies, their presence may be linked to the necessity of combining qualitative and quantitative approaches to achieve a more comprehensive understanding of the studied phenomenon. These studies allowed for the integration of multiple perspectives, enhancing the analysis by merging qualitative and quantitative data collection. By using both quantitative and

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

qualitative methods, researchers gained a deeper understanding of contextual factors and student perceptions, contributing to a broader and richer perspective on the subject.

Finally, the presence of hermeneutic, case, and basic descriptive studies may be related to the need for a detailed understanding and description of the relationship between GE and HB in a specific context. These approaches enabled the analysis and interpretation of meanings and social contexts in which GE is developed, offering an in-depth comprehension of practices and experiences related to the subject.

In summary, the prevalence of literature review research may be linked to the need for a holistic view of the topic. Meanwhile, the presence of quantitative, mixed, hermeneutic, and descriptive studies reflects the necessity of obtaining empirical data, gaining in-depth insights, and integrating different perspectives in research on GE and HB in an IST.

3.4. Contributions of Research on Educational Management and Soft Skills in a Technological Higher Education Institute.

Up to this point, common aspects have been identified in the reviewed documents. This section presents additional contributions derived from the research, allowing for a deeper understanding of the topics addressed. Recognizing the importance of Educational Management (GE) and Soft Skills (HB) in higher education is a key point. Passaillaigue et al. (2023) highlighted the relevance of knowledge management and organizational learning in educational institutions, offering ideas to improve the integration of GE and HB. In line with this, Monzón et al. (2022) introduced innovative approaches by focusing on specific strategies for integrating GE and HB in the educational context. These studies complemented the perspectives of Marcone et al. (2020) and Rodríguez Siu (2020), enriching the understanding of the relationship between GE and HB in an IST.

Following this exposition, the fundamental importance of GE and HB in the holistic development of IST students was recognized. Gaitán et al. (2023) contributed original insights by addressing how these competencies are integrated into specific academic programs, emphasizing the need for comprehensive training that combines technical knowledge with socio-emotional skills to prepare students for the workforce. Similarly, Lozano Fernández et al. (2022) emphasized the relevance of HB in quality education, underscoring the importance of promoting skills such as effective communication and critical thinking. These arguments support the ideas presented by Muñoz Maldonado and Sánchez (2020) and Moreno et al. (2020), who highlighted the importance of HB in student training and reinforced the need for GE to promote their development and application in the professional field.

Despite the positive aspects of Educational Management (GE) and Soft Skills (HB), there are challenges and obstacles to overcome. Chamorro (2023) highlighted resistance to change and lack of resources as barriers in knowledge management restructuring, making it difficult to effectively integrate GE and HB in an IST. On the other hand, Romero (2022) provided an additional perspective by analyzing the challenges in institutional management and the implementation of practices

related to these variables. Both authors emphasize the importance of strategically addressing these obstacles to achieve quality education in technological higher education institutes.

Building on this idea, Hernández and Neri (2020) and Carrillo et al. (2018) also identified barriers and areas for improvement in GE and HB, supporting the need for a strategic approach. Therefore, implementing specific strategies to successfully integrate GE and HB is essential. Vázquez et al. (2022) provided practical recommendations for strengthening HB in university students, while López et al. (2022) emphasized the need to reinforce GE at different levels, and Portocarrero et al. (2021) highlighted the importance of strategic approaches for academic sustainability. These authors enriched existing proposals and recognized the importance of addressing GE and HB from various perspectives, aiming to achieve comprehensive and high-quality education in an IST.

The study by Becker et al. (2023) highlighted the importance of Educational Management (GE) in promoting internationalization and the development of Soft Skills (HB) in a global context. Plasencia and Hidalgo (2022) emphasized the relevance of HB in change management, while Muñoz Iparraguirre et al. (2021) and Araya and Garita (2019) analyzed the improvement of leadership skills and proposed strategies to strengthen HB from different perspectives. These studies offer enriching perspectives on the relationship between GE and HB in an IST, allowing for a greater understanding of how these variables relate and impact the educational context.

Finally, the reviewed research made it possible to recognize the importance of integrating GE and HB in an IST. Espinoza and Gallegos (2020) stated that this integration is fundamental to training competent professionals adapted to labor market demands, emphasizing the need for a comprehensive approach to these two variables. These perspectives align with the findings of Montes (2019), Zepeda (2019), and Guerra (2019), who emphasized the importance of promoting HB development in student training, recognizing its impact on employability and job performance.

In terms of advancements, there is a growing adoption of educational technologies that facilitate the integration of GE and HB. Online learning platforms, learning management systems, and collaborative tools are being used to create more dynamic and interactive learning environments (Mora and Arce, 2020). These technologies have enabled educators to design activities that foster the development of soft skills, such as effective communication, teamwork, and problem-solving, while ensuring adequate knowledge management (Sánchez et al., 2023). Additionally, there has been a shift in pedagogical approaches toward student-centered methodologies focused on holistic development. This includes the implementation of interdisciplinary projects that promote collaboration between different areas of knowledge and the practical application of learned concepts (Zepeda et al., 2019), as well as the incorporation of formative assessments that consider both technical mastery and socio-emotional skills (Huapalla et al., 2024).

Regarding future perspectives, a greater synergy among educational institutions, businesses, and society is expected to strengthen the integration of GE and HB. This involves establishing strategic alliances to design training programs more aligned with labor market demands and societal needs (Pieck and Vicente, 2020). Additionally, greater emphasis on teacher training is anticipated, ensuring that educators are prepared to implement innovative and technology-driven approaches that support students' holistic development (Muñoz Maldonado and Sánchez, 2020; Moreno et al.,

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

2020). Furthermore, an increased inclusion of the socio-emotional dimension in academic curricula is foreseen, aiming to prepare students to face emotional and social challenges in today's world (Gaitán and Pérez, 2023).

In summary, current advancements and future perspectives in the integration of GE and HB point toward a more holistic and future-oriented approach in higher education.

Through the contributions of the reviewed research, elements can be identified that help understand how GE and HB relate and interact in an IST, emphasizing the importance of considering these variables in the design of educational strategies and the strengthening of students' comprehensive training. These studies provided practical approaches to improve the implementation of both variables in education. Recognizing and valuing the importance of this integration contributes to the training of competent professionals, prepared to face the challenges of the labor market.

Conclusions

The research has made it possible to identify and analyze the most relevant studies that have addressed educational management and soft skills in a technological higher education institute. Through this systematic review, a broad and updated perspective on this topic has been obtained, contributing to the understanding of the importance and challenges associated with integrating these variables in this context. It is important to highlight that educational management and soft skills play a fundamental role in the comprehensive development of students in technological higher education institutes. The review of studies has demonstrated the relevance of promoting socio-emotional competencies and transversal skills alongside technical knowledge, as this contributes to preparing students to face the challenges of the labor market and fostering their professional success.

For this reason, current research related to educational management and soft skills has focused on exploring effective strategies for integrating these variables into technological higher education institutes. The reviewed studies have examined the importance of promoting soft skill development in students, as well as their connection to the labor market. These studies have helped expand knowledge on the relevance of these competencies in students' comprehensive training and their application in specific educational contexts.

Therefore, greater attention and dedication are required from those responsible for educational management in technological higher education institutes. It is essential to establish policies and programs that promote the effective integration of educational management and soft skills into curricula and teaching practices. This involves training teachers in teaching and assessment strategies that foster the development of soft skills, as well as establishing partnerships with the business sector to facilitate students' labor market insertion and ensure their professional success.

Considering the importance of educational management and soft skills in technological higher education institutes, it is recommended to conduct future research that delves deeper into the evaluation of implemented strategies and their impact on student development. Additionally, it is

important to investigate the effectiveness of different teaching approaches and methodologies that promote soft skills development, as well as explore the relationship between educational management and students' academic and professional outcomes. These studies can provide additional insights and contribute to the continuous improvement of education in this field.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

References

Araya, E. y Garita, G. (2019). Propuesta para el fortalecimiento de habilidades técnicas, blandas y complementarias, y su impacto en el currículo TIC desde una perspectiva laboral, profesional y de gestión académica. *Revista Electrónica Calidad en la Educación Superior, 10*(2), 112-141. https://doi.org/10.22458/caes.v10i2.1907

Arias, J., Covinos, M., y Cáceres, M. (2020). Formulación de los objetivos específicos desde el alcance correlacional en trabajos de investigación. *Ciencia Latina, 4*(2), 237-247. https://doi.org/10.37811/cl_rcm.v4i2.73

Avelino, R. (2022). Importancia de las habilidades blandas y su relación con el clima organizacional en docentes de instituciones educativas. E-*IDEA 4.0 Revista Multidisciplinar, 4*(12), 33-46. https://doi.org/10.53734/mj.vol4.id242

Becker, S., Martín, J., Flores, J., Dinatale, C., y Salamone, T. (2023). Las Políticas de Internacionalización en las Instituciones de Educación Superior. Caso de estudio: Proyecto DHIP. *Revista Internacional de Investigación en Ciencias Sociales, 19*(1), 99-114. https://doi.org/10.18004/riics.2023.junio.99

Carrillo, O., Jurado, P., y Lagos, P. (2018). Las competencias ciudadanas en la formación profesional de las ciudades de Concepción (Chile) y Barcelona (España). *Revista española de orientación y psicopedagogía, 29*(3), 110-130. https://redined.educacion.gob.es/xmlui/bitstream/handle/11162/191963/Carrillo.pdf?sequence=1&isAllowed=y

Chamorro, D. (2023). De la empresa a la escuela: reconstrucción de la gestión del conocimiento en el campo educativo. *Revista Educación, 47*(1), 644-662. http://dx.doi.org/10.15517/revedu.v47i1.52026

Espinoza, M. y Gallegos, D. (2020). Habilidades blancas en la educación y la empresa: Mapeo Sistemático. *Revista Científica UISRAEL, 7*(2), 39-56. https://doi.org/10.35290/rcui.v7n2.2020.245

Gaitán, M. y Pérez, M. (2023). Análisis de las competencias blandas en las carreras de Administración de Empresas, Marketing y Publicidad. Universidad Católica Redemptoris Mater en Managua, Nicaragua. *Revista Científica Estelí*, *12*(45), 17-41. https://doi.org/10.5377/farem.v12i45.16035

Guerra, S. (2019). Una revisión panorámica al entrenamiento de las habilidades blandas en estudiantes universitarios. *Psicologia Escolar e Educacional, 23*. https://doi.org/10.1590/2175-35392019016464

Guirao, G. (2015). Utilidad y tipos de revisión de literatura. *ENE, 9*(2). https://dx.doi.org/10.4321/S1988-348X2015000200002

Hernández, C. y Neri, J. (2020). Las habilidades blandas en estudiantes de ingeniería de tres instituciones públicas de educación superior. *RIDE, 10*(20). https://doi.org/10.23913/ride.v10i20.678

Huapalla, L., García, L., y Pinedo, A. (2024). Habilidades Blandas en la Práctica Docente. *Revista Ciencia & Sociedad, 4*(1), 80–89. https://cienciaysociedaduatf.com/index.php/ciesocieuatf/article/view/114

López, A., Peña, J., Cristobal, I., Espinoza, L., y Saldaña, C. (2022). Análisis de la gestión administrativa en la Unidad de Gestión Educativa Local N.° 302, Leoncio Prado. *Gaceta Científica, 8*(3). https://doi.org/10.46794/gacien.8.3.1708

Lozano Fernández, M., Lozano Fernández, E., y Ortega, M. (2022). Habilidades blandas una clave para brindar educación de calidad: revisión teórica. *Conrado, 18*(87), 412-420. http://scielo.sld.cu/scielo.php?pid=S1990-86442022000400412&script=sci_arttext

Maluenda, J. (2022). Virtudes y debilidades en la mirada del Capital Humano en las Instituciones de Educación Superior. *Wimb Iu, 17*(1), 23-32. https://dialnet.unirioja.es/servlet/articulo?codigo=8498709

Marcone, P., Agudelo, M., Rojas, M., Godoy, J., y González, J. (2020). Autopercepción de las competencias de creatividad de innovación en estudiantes universitarios en Ciencias de la Salud factores de desarrollo. *Revista Española de Orientación y Psicopedagogía, 31*(3), 64-85. https://redined.educacion.gob.es/xmlui/bitstream/handle/11162/205109/Autopercepcion.pdf?sequence=1

Montes, H. (2019). Habilidades blandas en el estudiantado universitario y la empleabilidad en Costa Rica. *Revista Americana Arjé, 2*(2), 5-13. https://revistas.utn.ac.cr/index.php/arje/article/view/205

responsabilidad social: Factores clave en la gestión educativa universitaria. *Revista de Ciencias Sociales, 28*(5), 135-144. https://dialnet.unirioja.es/servlet/articulo?codigo=8471679

Monzón, A., Illa, G., Ruiz, R., y Candia, M. (2022). Neuromanagement y responsabilidad social: Factores clave en la gestión educativa universitaria. *Revista de Ciencias Sociales, 28*(5), 135-144. https://dialnet.unirioja.es/servlet/articulo?codigo=8471679

Mora, F. y Arce, J. (2020). El e-learning como potenciador de las habilidades blandas en la enseñanza de las ciencias de la administración: el caso de la Universidad Estatal a Distancia UNED de Costa Rica. *Revista Ensayos Pedagógicos, 15*(2), 233-252. https://doi.org/10.15359/rep.15-2.10

Moreno, L., Silva, M., Hidrobo, C., Fuentes, G., y Rincón, D. (2020). Comprensión y desarrollo de habilidades blandas en Instituciones de Educación Superior: Una mirada docente. *Revista de Investigación Transdisciplinaria en Educación, Empresa y Sociedad, 4*(4), 1-26. https://revistaseidec.com/index.php/ITEES/article/download/343/285

Muñoz Maldonado, G. y Sánchez, A. (2020). El aprendizaje organizacional en un Instituto de Educación Superior Tecnológico del Callao. *Voces y Silencios. Revista Latinoamericana de Educación, 11*(2), 84-102. https://doi.org/10.18175/VyS11.2.2020.5

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Muñoz Iparraguirre, H., Tuesta, W., Nolazco, F., y Menacho, J. (2021). Estrategia de mejora del liderazgo directivo y las habilidades gerenciales en el nivel educativo superior. *Ciencia Latina Revista Científica Multidisciplinar, 5*(6), 12461-12476. https://doi.org/10.37811/cl_rcm.v5i6.1262

Olmedo, R., Salazar, P., Román, J., y Valladares, N. (2023). Competencias genéricas o habilidades blandas en educación superior. *CIENCIAMATRIA, 9*(1), 946-960. https://dialnet.unirioja.es/servlet/articulo?codigo=9297320

Palma, A., Vélez, C., y Lamus, T. (2022). Gestión educativa y neuroliderazgo en el nivel de educación media de Manabí. *Polo del Conocimiento, 7*(11), 537-552. https://dialnet.unirioja.es/servlet/articulo?codigo=9263496

Passaillaigue, R. y Estrada, V. (2023). La gestión del conocimiento y el aprendizaje organizacional en instituciones de educación superior. *GECONTEC, 4*(2),35-43. https://doi.org/10.5281/zenodo.7506434

Pieck, E. y Vicente, M. (2020). Colaboración entre instituciones de formación para el trabajo y la educación media superior en México. *Revista mexicana de investigación educativa, 25*(84), 179-204. https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-66662020000100179&lng=es&nrm=iso&tlng=es

Plasencia, J. y Hidalgo, I. (2022). Competencias directivas y gestión del cambio en Institutos de Educación Superior Tecnológico Público. *Revista Gobierno y Gestión Pública, 8*(2), 10-32. https://www.aulavirtualusmp.pe/ojs/index.php/RevistaGobiernoyG/article/view/2348

Portocarrero, L., Restrepo, J., Valencia, M., y Calderón, L. (2021). Gestión educativa para la sostenibilidad académica en Colombia. *Formación universitaria, 14*(5), 107-118. http://dx.doi.org/10.4067/S0718-50062021000500107

Ramos, Y. (2022). Competencias directivas más valoradas en directores de instituciones de educación pública, Lima 2021: Innovación en la gestión educativa. *Sociedad, Cultura Y Creatividad, 1*(1), 117–122. https://doi.org/10.15765/wpscc.v1i1.3488

Rodríguez Siu, J. (2020). Las habilidades blandas como base del buen desempeño del docente universitario. *INNOVA Research Journal, 5*(2), 186-199. https://dialnet.unirioja.es/servlet/articulo?codigo=7475508

Rodríguez Siu, J., Rodríguez Salazar, R., y Fuerte, L. (2021). Habilidades blandas y el desempeño docente en el nivel superior de la educación. *Propósitos y Representaciones,9*(1). http://dx.doi.org/10.20511/pyr2021.v9n1.1038

Romero, J. (2022). Alcances y desafíos de la gestión institucional en el periodo 2020-2021. *Horizontes. Revista de Investigación en Ciencias de la Educación, 6*(25), 1627-1636. https://doi.org/10.33996/revistahorizontes.v6i25.441

Rosales, J. y Marcano, A. (2023). Planes comunitarios de riesgos en Suramérica. Una revisión sistemática. *Revista Geográfica De América Central, 1*(70), 107–134. https://www.revistas.una.ac.cr/index.php/geografica/article/view/16200

Rueda, J. y Portilla, S. (2020). Formación en competencias laborales generales, desafío para la educación superior. *I + D Revista de Investigaciones, 15*(1), 41-48. http://www.udi.edu.co/revistainvestigaciones/index.php/ID/article/view/232

Sánchez, J., Silva, M., López, H., Dávila, R., y Anticona, D. (2023). Las tecnologías de la información y comunicación y el desarrollo de habilidades blandas en estudiantes universitarios. *Universidad y Sociedad, 15*(3), 207-216. http://scielo.sld.cu/scielo.php?pid=S2218-36202023000300207&script=sci_arttext&tlng=en

Vázquez, L., Clara, M., Céspedes, S., Ceja, S., y Pacheco, E. (2022). Estudio sobre habilidades blandas en estudiantes universitarios: el caso del TECNM Coatzacoalcos. *IPSA Scientia, revista científica multidisciplinaria, 7*(1), 10-25. https://doi.org/10.25214/27114406.1311

Velez, L. (2022). Modelo de gestión educativa para el logro de aprendizaje significativo en estudiantes de enfermería de una Universidad de Chiclayo. *CURAE, 5*(2), 27-42. https://doi.org/10.26495/curae.v5i2.2307

Zepeda, M., Cardoso, E., y Rey, C. (2019). El desarrollo de habilidades blandas en la formación de ingenieros. *Científica, 23*(1), 61-67. https://www.redalyc.org/journal/614/61458265007/61458265007.pdf

Zepeda, M., Cardoso, E., y Cortés, J. (2020). El aprendizaje orientado en proyectos para el desarrollo de habilidades blandas en el nivel medio superior del IPN. *RIDE, 10*(19). https://doi.org/10.23913/ride.v10i19.530

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1251 • e-ISSN: 2631 - 2786

Research competencies for the design of a nuclear curriculum: a systematic review

Competencias investigativas para el diseño de un currículum nuclear: revisión sistemática

Date of receipt: 2024-04-01 • Date of acceptance: 2024-09-30 • Date of publication: 2025-01-10

Francisco Samuel Mendoza Moreira
Universidad Laica Eloy Alfaro de Manabí, Ecuador
francisco.mendoza@uleam.edu.ec
https://orcid.org/0000-0001-9959-5240

Abstract

The present study focused on the organization of a nuclear curriculum and its relationship with the development of investigative skills. Its main objective was to analyze existing experiences on the implementation of nuclear curricula with the purpose of proposing a strategy to enhance research competencies in teachers and researchers in Ecuador. To this end, a systematic review of the literature was carried out following the principles of the PRISMA declaration. The search was carried out in Google Scholar, selecting 34 articles that address the conception of the nuclear curriculum, its relationship with medical training and science teaching, as well as approaches for the development and evaluation of research competencies. The results highlighted the importance of implementing a core curriculum with research competencies as a crucial tool to guarantee essential skills and promote research in the educational field. Key practices such as interdisciplinary collaboration, early orientation toward research projects, and the use of technologies to enhance research teaching were identified. Finally, it is concluded that the effective implementation of a nuclear curriculum with investigative competencies requires appropriate pedagogical strategies that promote research as an integral part of the training process.

Keywords: research skills, core curriculum, systematic review, higher education

Resumen

El presente estudio se centró en la organización de un currículum nuclear y su relación con el desarrollo de competencias investigativas. Su objetivo principal fue analizar las experiencias existentes sobre la implementación de currículos nucleares con el propósito de proponer una estrategia para potenciar las competencias investigativas en docentes e investigadores en Ecuador. Para ello, se realizó una revisión sistemática de la literatura siguiendo los principios de la declaración PRISMA. La búsqueda se llevó a cabo en Google Académico, seleccionando 34 artículos que abordan la concepción del currículum nuclear, su relación con la formación médica y la enseñanza de las ciencias, así como enfoques para el desarrollo y evaluación de competencias investigativas. Los resultados destacaron la importancia de implementar un currículum nuclear con competencias investigativas como una herramienta crucial para garantizar habilidades esenciales y fomentar la investigación en el ámbito educativo. Se identificaron prácticas clave como la colaboración interdisciplinaria, la orientación temprana hacia proyectos de investigación y el uso de tecnologías para mejorar la enseñanza en investigación. Finalmente, se concluye que la implementación efectiva de un currículum nuclear con competencias investigativas requiere estrategias pedagógicas adecuadas que promuevan la investigación como parte integral del proceso formativo.

Palabras clave: competencias investigativas, currículum nuclear, revisión sistemática, educación superior

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

The “nuclear curriculum” represents the essential core of any study plan, serving as the foundation upon which the entire educational structure is built. Originally associated with medical training, this concept has evolved to encompass various fields of knowledge, including education. In Ecuador, for example, the implementation of a nuclear curriculum is reflected in Resolution RPC-SO-19-No.213-2015, which establishes a minimum curricular structure for higher education programs.

Beyond its origins in the medical field, the nuclear curriculum stands out for its relevance and durability, acting as a solid foundation upon which other curricular components are structured. Its key characteristics—efficiency, flexibility, hologrammaticity, consistency, and evaluability—ensure its adaptability and continued relevance in various educational contexts (Loureiro et al., 2015; Marcondes, 1996). In this study, its significance lies in providing an effective reference framework for higher education training. However, the results of the literature review indicated that there are no documented experiences of its application in other fields of knowledge (Ahn & Bomback, 2020; Bandaranayake, 2000; Harden & Davis, 1995).

Moreover, implementing a nuclear curriculum involves identifying key competencies, defining learning objectives, selecting fundamental content, organizing it sequentially, integrating interdisciplinary approaches, and incorporating appropriate assessment methods (Marcondes, 1996). These implementation strategies contribute to building a solid and effective curriculum that prepares students to face labor market challenges and contribute to societal development.

In this context, discussing competencies entails delving into a conceptual universe that allows for an understanding of the true essence of the educational activity related to them. From a holistic perspective, competencies are defined as a “cognitive complex” that encompasses a variety of interrelated elements that converge to form a coherent whole (Mendoza, 2008). This integrative approach is supported by various authors who argue that competencies are not limited to content mastery but also include skills, emotions, values, and attitudes that operate in relation to expected performance (Ceballos, 2020).

In particular, research competency emerges as a crucial element in the academic and professional fields. It is defined as a comprehensive set of knowledge, attitudes, skills, and abilities necessary to conduct research successfully. It involves the ability to acquire and apply research methodologies, critically analyze information, solve problems, and contribute to advancing knowledge in a specific area (Ayala, 2020; Barón, 2020; Reiban et al., 2017; Galvez, 2022; Hernández Suárez et al., 2021; Maldonado et al., 2007; Moscoso & Carpio, 2022).

The main objective of this study was to analyze existing experiences regarding the implementation of nuclear curricula to develop a strategy that strengthens research competencies in teachers and researchers in Ecuador. This research aimed to understand how nuclear curricula have been structured and applied in different contexts, focusing on identifying successful practices and lessons learned that can be adapted to the Ecuadorian educational environment. By focusing on research competencies, the study aimed to enhance not only teachers’ ability to conduct high-quality research but also to foster a culture of research within educational institutions. This meant

that nuclear curricula should not only ensure the acquisition of fundamental knowledge but also promote the development of critical thinking, methodological skills, and problem-solving abilities, integrated within an interdisciplinary approach. Strengthening these competencies is essential for advancing educational innovation and generating new knowledge, positioning education professionals as key players in developing research that addresses the country's social and academic needs.

1.1. Nuclear Curriculum

The "nuclear curriculum" represents the central and essential part of any educational program's study plan, encompassing the knowledge, skills, and competencies considered fundamental for achieving the proposed educational objectives. This section of the curriculum is characterized by its relevance and permanence, allowing it to serve as a solid foundation upon which the other curricular components are structured. Its design responds to the need to identify the basic and essential elements that any academic program, regardless of its level of specialization, must include to ensure comprehensive training (Reis et al., 2016). In this way, the nuclear curriculum establishes a common framework that facilitates the transmission and assimilation of necessary knowledge, contributing to students' professional development (Moreira Siquiera & Fortuna, 2022).

The nuclear curriculum originated in the medical field, and over time, its application has expanded to other areas, such as in Ecuador, where the Higher Education Council has adopted this approach to structure higher education training in the educational sector (Higher Education Council, 2015). Although the first documented experiences of its implementation date back to the 1980s, its potential extends beyond medicine, providing a coherent and adaptable structure for various academic and professional contexts. This approach aims not only to ensure that students acquire the fundamental knowledge of their discipline but also to promote scientific research as a constant activity within educational institutions, thereby strengthening academic productivity and development.

1.2. Competencias investigativas

The concept of competency refers to an individual's ability to mobilize a set of knowledge, skills, attitudes, and values that enable them to perform adequately in specific contexts (Mendoza, 2008). In the educational field, research competencies are defined as the necessary capacities to effectively carry out research. These competencies encompass the mastery of research methodologies, the critical ability to analyze information, problem-solving, and contributing to the advancement of knowledge in a given discipline (Castro, 2020).

Research competencies are structured into three levels: basic, complementary, and advanced. Basic competencies include the fundamental skills that every researcher needs to undertake scientific work, such as formulating research questions, collecting and analyzing data, and interpreting results. At the complementary level, skills related to communicating findings, both in academic settings and through formats accessible to diverse audiences, are included. Finally, at

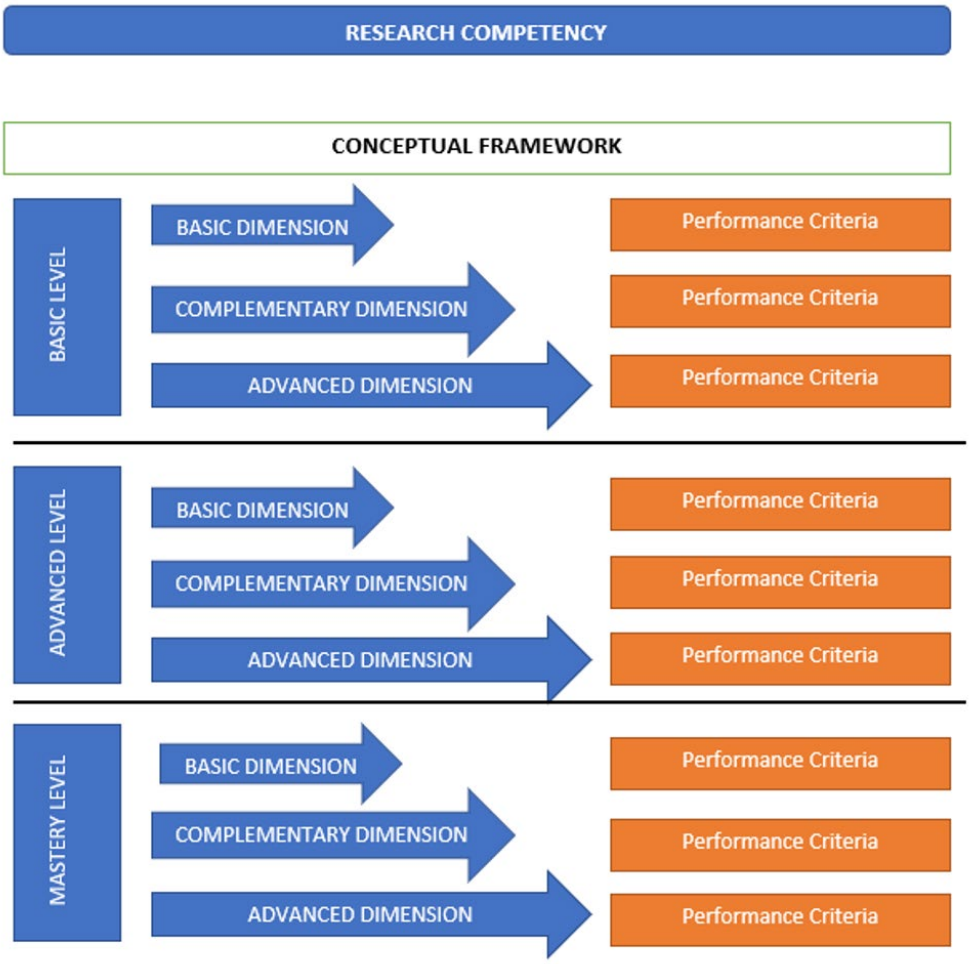
e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

the advanced level, competencies such as leadership in research projects and the ability to manage resources and work teams stand out (Quezada et al., 2020).

These competencies are essential not only for students but also for teachers, who must be capable of guiding the research process and fostering a research-oriented culture in the academic environment. Adapting to the specific characteristics of each field of knowledge, research competencies enable professionals to address the challenges of their respective disciplines and contribute to the development of new knowledge. The structuring of these competencies is key to comprehensive training and the promotion of a research culture within the educational system. *Figure 1* illustrates the curricular structure used in this study to conceptually develop research competency.

Figure 1

Curricular Structuring of Research Competency.



Methodology

The systematic literature review has been used for more than three decades, primarily in the health field, and has recently gained relevance in disciplines such as Social Sciences. Its usefulness in education is justified as it allows decision-makers to support their proposals with scientific evidence and promote the integration of policy, practice, and research. This type of review follows a rigorous methodology to identify, analyze, and interpret studies related to a specific research question. The PRISMA statement, one of the most widely used guidelines, establishes a structured process in four phases: identification, screening, eligibility, and inclusion, ensuring transparency and repeatability in the process.

In this study, a review was conducted within a documentary research framework (Páramo, 2020), following the principles established by the PRISMA statement (Moher et al., 2009) according to its flowchart and checklist. This systematic review was carried out using the Google Scholar search engine, which currently offers extensive coverage and includes a wide range of scientific articles. The article search was conducted in 2023 using English-language keywords derived from the literature and the UNESCO Thesaurus: research competencies, nuclear curriculum (*Table 1*).

Table 1

Search Equation.

Search Equation
TITLE-ABS-KEY ((core curriculum) AND (research skills OR research competencies))

The retrieved articles were examined after applying the following inclusion and exclusion criteria in the initial phase:

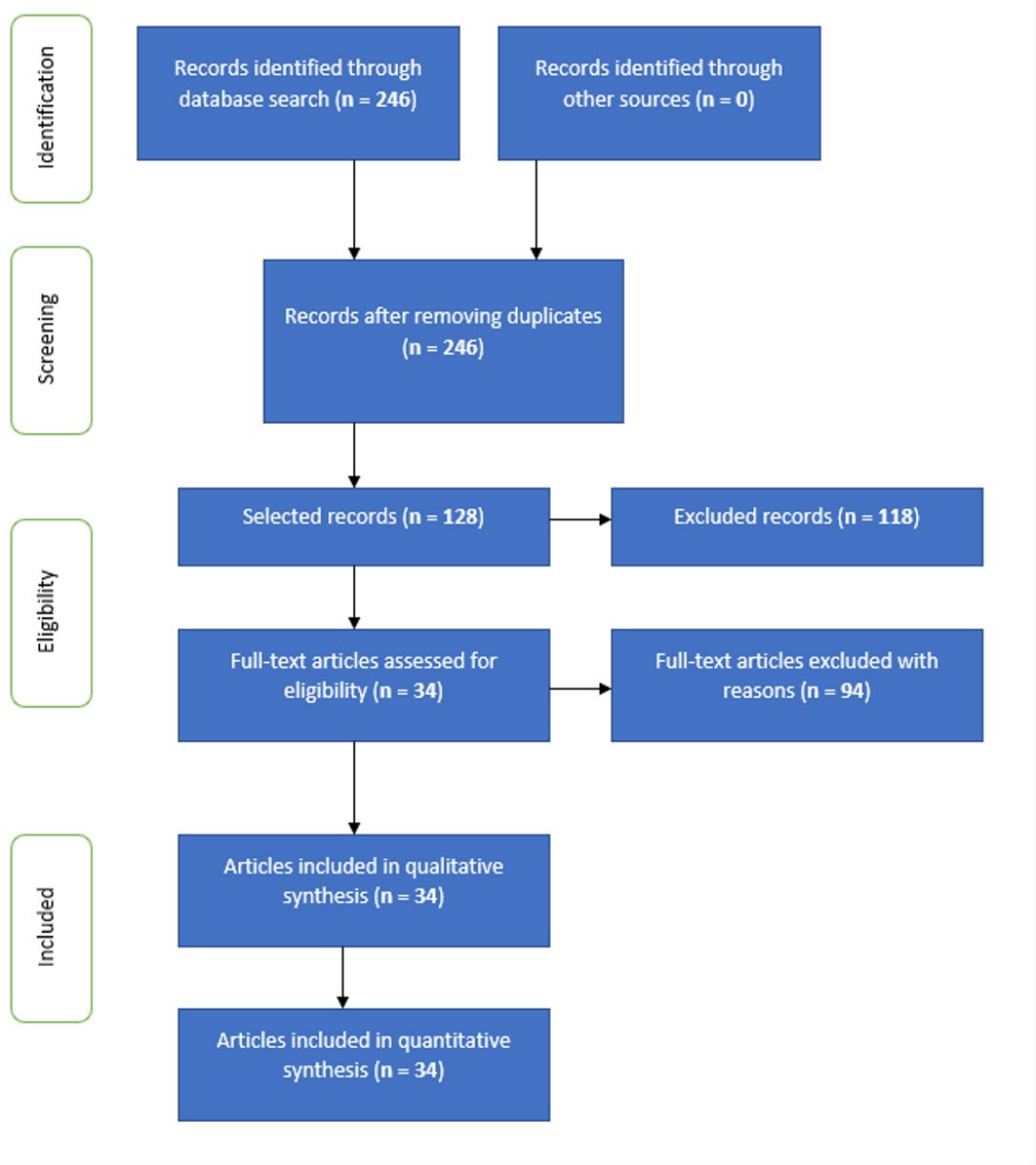
1. Works published up to 2022.
2. Articles in Spanish, Portuguese, and English.
3. Articles corresponding to empirical studies, excluding book chapters and conference proceedings.
4. Documents that include the analysis of research competencies and nuclear curriculum.

After applying the publication year filter, 246 documents were obtained. A second filter was then applied using language criteria (English and Spanish, excluding Portuguese documents), resulting in 128 articles. In the initial phase, the titles, abstracts, and keywords were carefully reviewed according to six inclusion criteria, from which 34 articles were selected, as shown in the flowchart and the four stages of the systematic review in *Figure 2*.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 2

Systematic Review Flow Diagram.



Of the 34 articles resulting from the search described previously, according to the inclusion and exclusion criteria, a content analysis was conducted considering the following elements (*Table 2*):

1. Concept of the nuclear curriculum: definitions of the concept under study.
2. Nuclear curriculum and medical education: studies related to medical training.
3. Nuclear curriculum and science education: studies related to science teaching.

Regarding the second dimension of the study, the classification criteria were as follows:

1. Approaches to developing research competencies
2. Training in research competencies
3. Instruments for evaluating research competencies
4. Research competencies of faculty members
5. Research competencies in students

The main research findings that address the research questions or objectives were presented.

Results

The implementation of a nuclear curriculum in professional training has been a subject of interest and debate in the educational field, particularly concerning the integration of research competencies. This approach aims to ensure that students acquire a core set of skills and knowledge necessary for professional practice while also fostering the development of research skills, which are essential in the healthcare field.

Over the years, various experiences have been carried out to characterize and understand the benefits, challenges, and best practices associated with implementing a nuclear curriculum that includes research competencies.

The introduction of a nuclear curriculum is based on the idea of providing a solid and standardized foundation of essential knowledge and skills for all students, regardless of their specialty or area of interest. This approach seeks to standardize learning experiences and ensure that all graduates are equipped with the necessary competencies to tackle professional training challenges.

Previous experiences in implementing a nuclear curriculum with research competencies have yielded varied results and valuable lessons. Firstly, it has been observed that integrating research competencies can enhance professional training by promoting critical thinking, problem-solving, and analytical skills among students. Several initiatives and pilot projects have helped identify key best practices for integrating research competencies into a nuclear curriculum. These include:

- Interdisciplinary collaboration between different academic departments and research groups.
- Designing research-focused courses and practical activities.
- Establishing mentoring opportunities for students interested in research.

Additionally, the importance of engaging students in research projects from early stages of their training has been highlighted. This allows them to develop research skills and gain an appreciation for scientific inquiry.

Thus, the implementation of a nuclear curriculum with research competencies represents a significant step towards a comprehensive and forward-looking professional education. While

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

there are challenges in implementation, previous experiences have provided valuable lessons and underscored the importance of continuing to explore innovative ways to integrate research into professional training.

3.1. Characterization of National Scientific Production on the Nuclear Curriculum.

*After exhaustive searches in scientific repositories, using Google's search engine, a meticulous review of various indexed journals from Latindex and Scopus databases was conducted. This rigorous process enabled the collection of a kno*wledge corpus spanning from 1996 to 2021, carefully identifying and selecting a total of 8 relevant articles on the topic of the nuclear curriculum.

For the characterization of scientific production, the categories detailed in *Table 2* were established.

Table 2

Categories of Scientific Production on the Nuclear Curriculum.

Analysis Categories	f	%
Concept of the nuclear curriculum	2	25.00%
Nuclear curriculum and medical education	5	62.50%
Nuclear curriculum and science education	1	12.50%
Production 1996 – 2021	8	100.00%

Note: Results from a Google Scholar search using the term "nuclear curriculum"..

3.1.1. Concept of the Nuclear Curriculum in Medical Education.

The concept of the "nuclear curriculum" in medical education focuses on the inclusion of essential competencies for medical practice (Marcondes, 1996). This approach seeks to ensure that all students acquire fundamental skills and knowledge necessary to practice medicine competently. By implementing a nuclear curriculum, students develop a solid foundation in critical areas of medicine, allowing them to acquire the necessary skills for clinical practice and standardizing learning experiences for all students.

The proposed nuclear curriculum system aims to ensure a balanced learning experience of core content while allowing students to supplement their learning based on their interests. Additionally, it seeks to establish an effective teaching and learning process for comprehensive medical training, incorporating new medical content and technological advancements. This is achieved by promoting interdepartmental integration and flexibility in incorporating materials, as well as offering additional courses and practical experiences.

Regarding the suggested administrative structure, the Congregation and the leadership of the school director play a key role in the process. The formation of a Curriculum Analysis Council, composed of faculty members and students, is proposed, along with the creation of task forces

with specific functions. These task forces contribute proposals and solutions to continuously improve the curriculum system. Furthermore, the nuclear curriculum can help ensure coherence and consistency in medical training by establishing a core set of objectives and competencies that all training programs must address (Palés, 2006).

In medical education, determining the core curriculum in basic sciences follows specific criteria. These include the relevance of topics for clinical understanding and application, as well as their recurrence in fundamental medical problems. The inclusion of these contents is considered essential for competent medical training, while topics not included in the core curriculum may be offered as optional modules. The depth at which these topics are covered is also defined to establish the evaluable aspects of the curriculum (Martínez, 2006).

In the curriculum update for specialized fields such as Diagnostic and Therapeutic Imaging, the role of a dedicated commission composed of faculty members and graduates is highlighted. This commission is responsible for contextualizing and analyzing the profession. The process begins with the identification of relevant professional practices to ensure the relevance of the study plan's content (Solís et al., 2019). In clinical communication, the Basic Curriculum Subgroup of the Teaching Committee has developed a consensus for a nuclear curriculum in clinical communication competencies, based on HPCCC teaching-learning objectives adapted to linguistic and cultural contexts (Ahn & Bomback, 2020).

Additionally, there is a growing integration of artificial intelligence into the medical physics curriculum and practice, highlighting its benefits in data management, clinical support, medical image analysis, and workload reduction. This integration aligns with technological and industrial trends, preparing professionals to tackle the challenges of modern healthcare (Zanca et al., 2021).

3.1.2. Nuclear Curriculum and Science Education.

The category of work emerges as a crucial organizing principle in science curriculum development. Recognizing it as a human and intentional activity aimed at transforming both the environment and human beings, this approach seeks to promote a comprehensive and emancipatory education. By adopting work as a central theme, the curriculum can be designed to foster critical analysis of the interactions between science, technology, society, and nature, enabling a broader and more reflective understanding of scientific disciplines (Moreira Siqueira & Fortuna, 2022).

The inclusion of work as an organizing principle also considers the historical nature of knowledge and its relationship with social practice. This allows for contextualization within historical and social timeframes and clarifies the ethical, political, and environmental implications of its application.

Additionally, concerns have been raised about trends adopted in the National Common Curricular Base for Secondary Education, reflecting a neoliberal orientation. This orientation favors a utilitarian approach to education, undermining the goal of an emancipatory education. The discrepancy between Secondary Education Reform and the BNCC, along with the influence of different interest groups in its formulation, may jeopardize the pursuit of a comprehensive education. This, in

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

turn, may contribute to maintaining bourgeois control over the Brazilian educational system and perpetuating social inequalities.

3.2. Characterization of Scientific Production on Research Competencies.

To conduct the characterization of scientific production related to research competencies, the categories detailed in *Table 3* have been developed. These categories were formulated based on an analysis of 26 articles published in various databases accessible through Google Scholar.

The inclusion criteria covered studies published in both regional journals and high-impact journals.

Table 3

Categories of Scientific Production on Research Competencies.

Analysis Categories	f	%
Approaches to developing research competencies	3	11.54%
Training in research competencies	9	34.62%
Instruments for evaluating research competencies	4	15.38%
Research competencies of faculty members	4	15.38%
Research competencies in students	6	23.08%
Production 2019 – 2024	26	100.00%

Note: Results from a Google Scholar search using the term “research competencies”.

3.2.1. Approaches to Developing Research Competencies.

The characterization of approaches to addressing research competency in the university setting is based on various studies that have explored this topic from different perspectives.

First, a study conducted at Universidad de Los Andes focused on university faculty members from various fields to record, analyze, and interpret attitudinal research competencies (Fontanilla & Mercado, 2020). This descriptive-analytical approach provides a comprehensive view of the research competencies present in university faculty members.

Another approach was the didactic model proposed for pedagogy students, which focuses on socioformation and the development of research competencies (Ceballos, 2020). This perspective sought to turn students into education researchers, fostering the collaborative development of research projects and the application of intervention strategies. Additionally, the use of evaluation instruments to measure the impact of these competencies on students was highlighted, demonstrating a practical and results-oriented approach.

Moreover, deficiencies in integrating Information and Communication Technologies (ICTs) in university teaching have been identified, which negatively impact scientific production. A lack of

training and professional development in the pedagogical use of ICTs limits the application of innovative teaching strategies and the use of technological tools to promote research among university faculty members (Tusta, 2021).

In this context, recommendations to improve research competencies in university teaching include:

- Promoting ICT training programs within educational institutions.
- Encouraging collaborative networks among faculty members to share knowledge and experiences.
- Strategically and systematically integrating ICTs into academic training, which will enhance teaching quality and promote scientific production in universities.

The approaches to addressing research competencies in higher education range from evaluating and analyzing existing competencies among faculty to implementing teaching strategies focused on researcher training. However, it is crucial to address gaps in ICT integration to foster a more research-conducive university environment and enhance scientific production.

3.2.2. Training in Research Competencies.

The training of research competencies in higher education is based on the integration of cognitive dimensions, knowledge, skills, personal qualities, attitudes, abilities, and metacognitive aspects, enabling students to successfully engage in research activities. This complex approach introduces a new conception of research competency development, addressing it from the epistemology of complexity and promoting the integration of various elements (Reiban et al., 2017).

Universities have implemented various strategies to enhance research competency training, including:

- Research incubators
- Project-based learning
- Teaching-learning approaches that incorporate technology

For example, a study by Parra (2017) demonstrated the effectiveness of mobile learning with apps in fostering research skills. Furthermore, a shift toward a competency-based teaching model has been emphasized, which also requires a review of assessment strategies.

The microcurriculum approach has been identified as a means to develop research competencies, incorporating pedagogical strategies that directly impact academic activities related to research (Girón, 2021). This requires faculty responsible for designing microcurricula to have:

- Expertise in competency-based teaching methods
- Strong research methodology skills

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

- First-hand research experience
- Qualities and attitudes that enhance research training

Acquiring and developing research competencies in university students is considered crucial for:

- Meeting the demands of the current and future job market
- Fostering innovation and business competitiveness (Hernández et al., 2021)

To achieve this, pedagogical strategies based on cooperative learning and research competency development within professional training programs have been proposed, emphasizing a more practical and participatory learning approach.

The growing access to ICTs among university faculty presents new opportunities to:

- Improve research in higher education
- Facilitate knowledge access
- Promote innovation in teaching
- Increase faculty motivation to stay up-to-date in research-related topics

However, despite greater accessibility to ICTs, there are still gaps and inconsistencies in their use by university faculty members, including:

- Lack of proper training
- Difficulties integrating ICTs into research processes
- Absence of standardization
- Limited access to advanced research tools

These challenges highlight the need to address barriers to effectively using ICTs in research and developing research competencies (Moreira Moreira et al., 2021).

The training of research competencies in higher education is fundamental to preparing students for the challenges of the professional world and contributing to social and economic development. Achieving this requires:

- Innovative pedagogical strategies
- Integration of technology
- A practical and participatory approach to learning
- Overcoming barriers to the effective use of ICTs in research

(Cárdenas et al., 2021; Carlín et al., 2020; Chávez Barquero et al., 2016; Chávez Vera et al., 2022).

3.2.3. Evaluation of Research Competencies

The evaluation of research competencies in higher education can be characterized by considering basic, complementary, and advanced competencies that both faculty and students must possess. These competencies encompass a broad spectrum of skills, knowledge, and attitudes necessary for effective research engagement. Based on the reviewed articles, the evaluation of research competencies is characterized as follows:

1. Basic Research Competencies: The evaluation of these competencies focuses on assessing the acquisition of fundamental scientific research knowledge, the ability to collect, analyze, and synthesize relevant information, as well as the skill to formulate pertinent research questions and apply appropriate research methods. Assessment methods may include written exams, analysis of student- or faculty-conducted research projects, and participation in simulated or real research activities.
2. Complementary Research Competencies: The evaluation of these competencies aims to determine the ability to effectively communicate research findings, both in specialized media and at academic conferences and events. Evaluation rubrics can be used to analyze clarity, coherence, and relevance in communicating research results. Additionally, the ability to disseminate findings in appropriate formats for different audiences can be assessed.
3. Advanced Research Competencies: The evaluation of these competencies involves verifying the ability to work in multidisciplinary teams, lead research projects, develop innovative proposals, and manage resources for project execution. This evaluation may include the review of research projects led by students or faculty as well as participation in simulated or real project management activities (Maldonado et al., 2007).
4. Self-Perception and Motivation: The self-perception of faculty and students as researchers can also be evaluated through surveys or interviews that explore motivation, commitment, and perception of research skills. These assessments provide valuable insights into individuals' willingness to develop research competencies and their influence on the teaching and learning process (Quezada et al., 2020).
5. Validation of Evaluation Instruments: The validation of evaluation instruments, such as questionnaires or rubrics, is crucial to ensuring reliability and validity in the results obtained. This evaluation may include expert review and pilot testing of instruments to verify their effectiveness and relevance in measuring research competencies (Rodríguez et al., 2020).

The evaluation of research competencies in higher education requires a combination of methods and tools to verify the acquisition and development of research-related skills, knowledge, and attitudes. Additionally, it is important to consider individuals' self-perception and to validate evaluation instruments to ensure the reliability and accuracy of the obtained results (Ponce et al., 2020).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

3.2.4. Research Competencies of Faculty Members

The research competency of faculty members is characterized by its comprehensive development through socioformation, which aims to cultivate both cognitive and affective-behavioral aspects necessary to address the challenges of the knowledge society. Socioformation fosters collaborative work, contextual problem-solving, and an ethic of continuous improvement. In this regard, the faculty research competency focuses on equipping educators to identify, interpret, argue, and solve problems ethically and efficiently, thereby contributing to sustainable social development (Barón, 2020).

The proposed research competencies can be implemented in education through various pedagogical strategies, such as:

6. Promoting Research in the Classroom: Faculty members can encourage research among students by guiding them to identify and solve relevant contextual problems using different methods and approaches.
7. Developing Formative Projects: Formative projects, as part of socioformative methodology, allow students to develop research competencies by addressing real-world problems, interpreting data, and arguing conclusions.
8. Collaborative Work: Encouraging teamwork as a key research competency enables knowledge and skills sharing to address problems more effectively.
9. Critical Reflection: Promoting students' ability to critically analyze information, evaluate different research approaches, and reflect on their own research process (Aliaga & Luna, 2020).

The validation of these competencies was conducted through confirmatory factor analysis, which demonstrated a high correlation between competencies and their associated actions. This analysis validated the conceptual structure of proposed research competencies and established their relationship with specific actions that characterize them (Moscoso & Carpio, 2022).

In the current academic context, higher education researchers face challenges that require constant updating of their competencies as well as institutional adaptations to meet the changing demands of society and academia. This includes the need to:

- Address new economic, educational, and cultural challenges.
- Incorporate knowledge society dynamics.
- Adapt to 21st-century educational demands (Yangali et al., 2020).

The analysis of faculty research competency revealed that attitudinal competency was the highest-rated, suggesting a strong willingness among faculty members to engage in research. Furthermore, the importance of methodological training and faculty research capacity is emphasized, as these are critical for effectively guiding students in the development of research competencies from early stages of education.

The promotion of a research culture and the strengthening of faculty research competencies can be achieved through comprehensive training programs, collaborative work, and critical reflection, contributing to high-quality education and research advancement in academia.

3.2.5. Research Competencies in Students.

Research competency in students is characterized by developing cognitive and behavioral skills that enable them to conduct rigorous and effective research (Juárez & Torres, 2022). According to the study, university students reported having developed competencies such as:

- Theoretical contrast skills
- Scientific writing
- Mastery of citation and referencing norms

Additionally, other key competencies mentioned include observation, reading, expression, creativity, rigor, socialization, construction, strategy, problematization, and ethics (Ayala, 2020).

Participation in research incubators significantly contributes to developing these higher-order cognitive skills in students. These competencies not only serve as a cognitive bridge for meaningful learning but also prepare students to:

- Face sociocultural, economic, and political challenges.
- Foster personal and social development (Hernández et al., 2021).

The implementation of specific teaching strategies, such as project-based learning in the classroom or allowing students to choose real-world problems to investigate, has a direct impact on developing basic research competencies.

Results indicate that students achieved high levels of performance in aspects such as autonomy and strategy, while areas like socialization and access to research resources still have room for improvement (Gómez et al., 2019).

In graduate programs, these competencies become even more relevant, as they enable students to conduct scientific research rigorously and contribute to advancing knowledge in their respective fields. Additionally, promoting a research culture and ensuring open access to nonprofit academic education are key factors driving the development of these competencies (Zambrano & Chacón, 2021).

The development of research competencies in university students is essential for their comprehensive education and their contribution to knowledge advancement in various disciplines. Implementing effective teaching strategies and fostering a research culture are critical for enhancing these skills and promoting meaningful and lasting learning experiences.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

3.2.6. Integration of Research Competencies into a Nuclear Curriculum

The integration of research competencies within a nuclear curriculum involves a structured approach to ensure that students acquire fundamental research skills in addition to the essential knowledge of their discipline. This process begins with the identification of key research competencies that should be developed at all stages of professional training, regardless of the student's specialization. These competencies may include critical thinking, the ability to formulate research questions, mastery of appropriate methodologies, and data interpretation.

To implement these competencies within a nuclear curriculum, a curriculum design is required that promotes research from the early stages of education. This can be achieved through:

- Specialized courses on research methodology
- Research projects integrated into the curriculum
- Practical activities that encourage the application of research knowledge

Additionally, it is essential to establish a mentorship system in which students collaborate with experienced faculty members and researchers, allowing them to participate in real research projects and apply their research skills in practical contexts.

Furthermore, interdisciplinarity plays a key role in this process, as it enables students to collaborate across different fields of knowledge, enriching their research training. Continuous assessment of these competencies should be incorporated, using evaluation tools that measure not only technical proficiency in research but also problem-solving abilities, creativity, and project management skills.

The integration of Information and Communication Technologies (ICTs) in the development of these competencies is another critical factor. The use of digital tools for information retrieval, data analysis, and online collaboration facilitates the incorporation of research into teaching and prepares students for the challenges of the academic and professional environment.

Thus, a nuclear curriculum with integrated research competencies not only prepares students to become competent professionals but also equips them to actively contribute to knowledge advancement.

Conclusions

The implementation of a core curriculum that incorporates research competencies in professional training emerges as a fundamental pillar. This not only ensures that students acquire essential skills to competently perform in their respective fields but also fosters the development of crucial research capabilities in disciplines such as health and other areas. It is important to recognize that there are various approaches and practices to integrate these competencies into the core curriculum. Interdisciplinary collaboration, the design of research-focused courses, and early mentorship in research projects are examples of strategies that nurture students' critical and analytical thinking.

The assessment of research competencies covers a broad spectrum, from verifying fundamental knowledge to evaluating the ability to effectively communicate results, work in multidisciplinary teams, and lead research projects. This process requires the use of appropriate assessment methods and tools to measure progress and goal achievement. It is crucial to understand that the development of research competencies is not limited to students. It also involves fostering these capabilities in faculty members, promoting a research culture within the educational environment, and contributing to knowledge advancement and innovation.

Lastly, the effective integration of information and communication technologies (ICT) in research training and practice plays a vital role. This not only enhances the quality of education but also drives scientific production and prepares professionals to face evolving challenges in their fields of study. This study highlighted the importance of implementing a core curriculum that integrates research competencies in professional training, as well as the need for effective strategies to develop and assess these skills in both students and faculty.

One of the main limitations of the study was the lack of diversity in information sources, as most of the reviewed articles came from databases such as Google Scholar. This may have limited the inclusion of relevant studies that are not indexed on this platform. Additionally, the review focused on publications in Spanish and English, excluding articles in other languages, which might have restricted the scope of the findings. Furthermore, the study's focus on literature published up to 2022 may have excluded more recent research that offers new approaches or practices regarding the core curriculum and research competencies.

Another significant limitation was the concentration of studies in specific areas such as medicine and sciences, leaving a gap regarding documented experiences in other disciplines. The lack of experiences in fields outside the medical and scientific domains may have constrained the development of a proposal that encompasses a broader variety of educational contexts. Moreover, the implementation of the strategies suggested in this study has not yet been extensively tested in the Ecuadorian context, leaving room for unforeseen challenges in applying these recommendations.

Despite these limitations, the study's results offered valuable practical implications. Implementing a core curriculum that integrates research competencies in education can promote a more structured and coherent approach to training students and faculty, enhancing their ability to generate and apply knowledge critically and methodically. The inclusion of research competencies fosters critical thinking and problem-solving, key skills in today's professional world, especially in fields where research is essential for knowledge advancement.

Additionally, promoting interdisciplinary collaboration and the use of technology in teaching and research can enrich the educational experience and prepare students for the challenges of the 21st century. The study suggested that engaging students in research projects from early stages is an effective strategy for developing research competencies, which could be replicated at different educational levels. Finally, universities and educational institutions in Ecuador could benefit from adopting these strategies not only to improve the quality of education but also to contribute to the growth of a strong and sustained research culture in the country.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Resource

Ahn, W. y Bomback, A. (2020). Approach to Diagnosis and Management of Primary Glomerular Diseases Due to Podocytopathies in Adults: Core Curriculum 2020. *American Journal of Kidney Diseases*, *75*(6), 955–964. https://doi.org/10.1053/j.ajkd.2019.12.019

Aliaga, A. y Luna, J. (2020). La construcción de competencias investigativas del docente de posgrado para lograr el desarrollo social sostenible. *Revista Espacios*, *41*(20), 1–12. https://www.revistaespacios.com/a20v41n20/20412001.html

Ayala, O. (2020). Competencias informacionales y competencias investigativas en estudiantes universitarios. *Revista Innova Educación*, *2*(4), 668–679. https://doi.org/10.35622/j.rie.2020.04.011

Bandaranayake, R. (2000). The concept and practicability of a core curriculum in basic medical education. *Medical Teacher*, *22*(6), 560–563. https://doi.org/10.1080/01421590050175523

Barón, L. (2020). Competencias investigativas en docentes de la asignatura de investigación de educación básica y media. *Mérito: Revista de Educación*, *2*(4), 12–31. https://doi.org/10.33996/merito.v2i4.129

Cárdenas, M., Sánchez, E., y Guerra, C. (2021). La formación de la competencia investigativa mediada por las TIC en el docente universitario. *Revista Universidad y Sociedad*, *13*(6), 51–58.

Carlín, E., Carballosa, A., y Herrera, K. (2020). Formación de competencias investigativas de los estudiantes de la Universidad de Guayaquil. *Universidad y Sociedad*, *12*(2), 8–16. https://www.researchgate.net/publication/354371964_Formacion_de_competencias_investigativas_de_los_estudiantes_en_la_Universidad_de_Guayaquil

Castro, Y. (2020). Desarrollo de competencias investigativas en estudiantes de las Ciencias de la Salud. Sistematización de experiencias. *Duazary*, *17*(4), 65–80. https://doi.org/10.21676/2389783x.3602

Ceballos, J. (2020). La socioformación y el desarrollo de competencias investigativas: un enfoque didáctico para la investigación en estudiantes de pedagogía. *Revista Internacional de Tecnología, Conocimiento y Sociedad*, *8*(1), 21–36. https://doi.org/10.18848/2474-588x/cgp/v08i01/21-36

Chávez Barquero, F., Cantú, M., y Rodríguez, C. (2016). Competencias digitales y tratamiento de información desde la mirada infantil. *Revista Electrónica de Investigación Educativa*, *18*(1), 209–220. https://www.scielo.org.mx/scielo.php?pid=S1607-40412016000100015&script=sci_arttext

Chávez Vera, K., Calanchez, Á., Tuesta, J., y Valladolid, A. (2022). Formación de competencias investigativas en los estudiantes universitarios. *Revista Universidad y Sociedad*, *14*(1), 426–434.

Consejo de Educación Superior (2015). *Propuesta curricular genérica de las carreras de Educación*. CES.

Fontanilla, N. y Mercado, Z. (2020). Competencias investigativas actitudinales que promueve el docente en su acción didáctica universitaria. *Educere: La Revista Venezolana de Educación*, *24*(77), 85–94.

Galvez, E. (2022). Competencias investigadoras y producción científica en docentes de la Facultad de Ingeniería en Universidad Privada-Chiclayo. *RedCA*, *5*(14), 141-156. https://doi.org/10.36677/redca.v5i14.19272

Girón, O. (2021). Desarrollo de la competencia investigativa: una mirada desde el microcurrículo. *Revista Guatemalteca de Educación Superior*, *5*(1), 160–170. https://doi.org/10.46954/revistages.v5i1.83

Gómez, J., Isea, N., y López, V. (2019). Competencias investigativas y su influencia en la formulación de proyectos de investigación en la Universidad Valle del Momboy. *Actualidades Pedagógicas*, *1*(74), 177–189. https://doi.org/10.19052/ap.vol1.iss74.9

Harden, R. y Davis, M. (1995). AMEE Medical Education Guide No. 5. The core curriculum with options or special study modules. *Medical Teacher*, *17*(2), 125–148. https://doi.org/10.3109/01421599509008301

Hernández, I., Lay, N., Herrera, H., y Rodríguez, M. (2021). Estrategias pedagógicas para el aprendizaje y desarrollo de competencias investigativas en estudiantes universitarios. *Revista de Ciencias Sociales*, *27*(2), 242–255. https://dialnet.unirioja.es/servlet/articulo?codigo=7927662

Hernández Suárez, C., Gamboa, A., y Prada, R. (2021). Percepciones sobre el desarrollo de competencias investigativas en estudiantes de semilleros de investigación. *Boletín REDIPE*, *10*(12), 404–423. https://revista.redipe.org/index.php/1/article/view/1598

Juárez, D. y Torres, C. (2022). La competencia investigativa básica. Una estrategia didáctica para la era digital. *Sinéctica*, (58). https://doi.org/10.31391/s2007-7033(2022)0058-003

Loureiro, E., Cavaco, A., y Ferreira, M. A. (2015). Competências de Comunicação Clínica: Objetivos de Ensino-Aprendizagem para um Currículo Nuclear nas Áreas da Saúde. *Revista Brasileira de Educação Médica*, *39*(4), 491–495. https://doi.org/10.1590/1981-52712015v39n4e01732015

Maldonado, L., Landazabal, D., Hernández, J., Ruiz, Y., Claro, A., Vanegas, H., y Cruz, S. (2007). Visibilidad y formación en investigación. Estrategias para el desarrollo de competencias investigativas. *Revista Studiositas Bogotá*, *2*(2), 43–56. http://hdl.handle.net/10983/502

Marcondes, E. (1996). Currículo nuclear. *Medicina, Ribeirão Preto*, *29*(4), 389–395.

https://doi.org/10.11606/issn.2176-7262.v29i4p389-395

Martínez, E. (2006). El “core curriculum”: un debate en la educación médica. *Educación y Educadores*, *9*(2), 189–196. http://www.scielo.org.co/scielo.php?pid=S0123-12942006000200013&script=sci_arttext

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Mendoza, F. (2008). Diseño Instruccional por Competencias Humanas Globalizadas. *I Congreso virtual Iberoamerica de Calidad de la Educación a Distancia*. EduQalidad. http://eduqa2008.eduqa.net/eduqa2008/images/ponencias/eje_tematico_3/3_14_Diseno_Instruccional_por_Competencias_parte_1__Mendoza_Moreira_.pdf

Moher, D., Liberati, A., Tetzlaff, J., y Altman, D. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Medicine*, *6*(7). https://doi.org/10.1371/journal.pmed.1000097

Moreira Siqueira, R., y Fortuna, E. (2022). As ciências da natureza na BNCC para o ensino médio: reflexões a partir da categoria trabalho como princípio organizador do currículo. *Revista Contexto & Educação*, *37*(116), 421–441. https://doi.org/10.21527/2179-1309.2022.116.10451

Moreira Moreira, L., Cano, E., y Moreira, J. (2021). Formación basada en competencias investigativas en los estudiantes de pregrado de Latinoamérica. *FIPCAEC*, *6*(1), 665–684. https://doi.org/10.23857/fipcaec.v6i1.362

Moscoso, M. y Carpio, L. (2022). Estudio de las competencias investigativas del docente investigador de la Universidad del Azuay. *UDA AKADEM, 1*(9), 178–209. https://doi.org/10.33324/udaakadem.v1i9.482

Palés, J. (2006). Planificar un currículum o un programa formativo. *Educación Médica*, *9*(2), 59–65. https://www.researchgate.net/publication/251077034_Planificar_un_curriculum_o_un_programa_formativo

Páramo, P. (2020). *Cómo elaborar una revisión sistemática*. Universidad Pedagógica Nacional. https://doi.org/10.13140/RG.2.2.31465.85608

Ponce, R., Soler, S., Hernández, A., Díaz, A., y Soler, L. (2020). Validez y fiabilidad de un cuestionario que evalúa competencias investigativas e innovativas. *Revista Médica Electrónica*, *42*(5). https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=106304

Quezada, G., Castro, M., Oliva, J., y Quezada, M. (2020). Autopercepción de la labor docente universitaria: identificando competencias investigativas aplicables en el 2020. *Boletín REDIPE*, *9*(1), 167–176. https://revista.redipe.org/index.php/1/article/view/905

Reiban, R., De La Rosa, H., y Zeballos, J. (2017). Competencias investigativas en la Educación Superior. *Revista Publicando, 4*(10), 395-405. https://revistapublicando.org/revista/index.php/crv/article/view/439

Reis, S., Renzulli, J., y Burns, D. (2016). *Curriculum compacting: a guide to differentiating curriculum and instruction through enrichment and acceleration.* Routledge.

Rodríguez, M., Zabala, S., y Mejía, R. (2020). Evaluación de la competencia investigativa en la Licenciatura en Educación Inicial desde la visión del estudiantado. *Revista Espacios*, *41*(16), 15–29. https://www.revistaespacios.com/a20v41n16/20411615.html

Solís, S., Masís, C., y Jiménez, A. (2019). Formación en imagenología en la Universidad de Costa Rica: Retos y desafíos del proceso de actualización del currículo. *Actualidades Investigativas En Educación*, *20*(1), 1–22. https://doi.org/10.15517/aie.v20i1.40083

Tuesta, J. (2021). Las Tecnologías de la Información y Comunicación, competencias investigativas y docencia universitaria: revisión sistemática. *Maestro y Sociedad*, *18*(2), 440–456. https://maestroysociedad.uo.edu.cu/index.php/MyS/article/view/5350

Yangali, J., Vásquez, M., Huaita, D., y Luza, F. (2020). Cultura de investigación y competencias investigativas de docentes universitarios del sur de Lima. *Revista Venezolana de Gerencia*, *25*(91), 1159–1179. https://biblat.unam.mx/hevila/Revistavenezolanadegerencia/2020/Vol.%2025/No.%2091/27.pdf

Zambrano, H. y Chacón, C. (2021). Competencias investigativas en la formación de posgrado. Análisis cualitativo. *Revista Educación*, *45*(2), 1–18. https://doi.org/10.15517/revedu.v45i1.43646

Zanca, F., Hernández, I., Avanzo, M., Guidi, G., Crijns, W., Diaz, O., Kagadis, G., Rampado, O., Lonne, P., Ken, S., Colgan, N., Zaidi, H., Zakaria, G., y Kortesniemi, M. (2021). Expanding the medical physicist curricular and professional programme to include Artificial Intelligence. *Physica Medica*, *83*, 174–183. https://doi.org/10.1016/j.ejmp.2021.01.069

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1257 • e-ISSN: 2631 - 2786

Impact of experimental kits on science and practical skills training in chemistry students: a systematic review (2018-2023)

Impacto de los kits experimentales en la formación de habilidades científicas y prácticas en alumnos de química: una revisión sistemática (2018-2023)

Date of receipt: 2024-05-15 • Date of acceptance: 2024-10-16 • Date of publication: 2025-01-10

Luis Orlando Chonillo Sislema
luischonillo035@gmail.com
https://orcid.org/0000-0002-7461-1096

Abstract

The study presents the main findings on the impact that experimental kits have had on the formation of scientific and practical skills in high school and university chemistry students through a systematic review following the phases of the PRISMA protocol. After a search and selection using inclusion and exclusion criteria, 18 studies selected from the Scopus, Google Scholar, and ERIC databases were analyzed. The results indicated that experimental kits facilitate observation, interpretation of results, proper handling of instruments, formulation of hypotheses, analysis of physical and chemical changes, as well as evaluation of quantitative and qualitative data, among others. In addition, socioeconomic factors such as inclusion in curricular planning are key determinants of the effectiveness and scope of experimental kits. In contexts where these aspects are adequately managed, a notable improvement in the quality of practical education was observed, contributing significantly to more enriching and effective learning. Concluding that experimental kits are effective resources for the training of practical and scientific skills, offering remarkable benefits thanks to their versatility, portability, safety, ease of use, and low maintenance cost.

Keywords: experimental kits, chemistry teaching, practical abilities, scientific abilities, laboratory kits

Resumen

El estudio presentó los principales hallazgos acerca del impacto que han tenido los kits experimentales en la formación de habilidades científicas y prácticas en estudiantes de química de secundaria y universitaria, mediante una revisión sistemática siguiendo las fases del protocolo PRISMA. Luego de una búsqueda y selección mediante criterios de inclusión y exclusión, se analizaron 18 estudios seleccionados de las bases de datos Scopus, Google Académico y ERIC. Los resultados señalaron que los kits experimentales facilitan la observación, la interpretación de los resultados, un adecuado manejo de instrumentos, formulación de hipótesis y análisis de cambios físicos y químicos, así como la evaluación de datos cuantitativos y cualitativos, entre otros. Además, factores socioeconómicos como la inclusión en la planificación curricular son determinantes claves en la efectividad y el alcance de los kits experimentales. En contextos donde estos aspectos se gestionan de manera adecuada, se observó una notable mejora en la calidad de la educación práctica que contribuye significativamente a un aprendizaje más enriquecedor y efectivo. Concluyendo que los kits experimentales son recursos eficaces para la formación de habilidades prácticas y científicas, ofreciendo beneficios notables gracias a su versatilidad, portabilidad, seguridad, facilidad de uso y su bajo costo de mantenimiento..

Palabras clave: kits experimentales, enseñanza de la Química, habilidades prácticas, habilidades científicas, kits laboratorio

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

Chemistry is essential for unraveling the mysteries of our environment, yet it often presents significant challenges in both teaching and learning. This can make the subject overwhelming and unappealing to some students, especially because this difficulty is compounded by their lack of practical skills.

On the other hand, acquiring knowledge in chemistry is greatly enhanced when students engage in practical activities. Therefore, it is crucial for educators to employ a variety of didactic strategies to capture students' interest and increase their motivation toward the subject.

In this regard, experimental kits (hereinafter referred to as EKs) have proven to be valuable tools at both the secondary (high school) and university levels. They play an important role in students' intellectual development by providing practical resources that help them understand chemistry concepts more effectively (Sandoval et al., 2013). These kits enable students to observe, measure, and interact with chemical phenomena in ways that would not be possible in a conventional laboratory.

According to Espinosa et al. (2016), students have shown a growing interest in studying chemistry due to experimental work, which allows them to understand chemical phenomena from both theoretical and practical perspectives. This integration facilitates the learning of procedural, conceptual, and attitudinal knowledge, promoting the development of scientific and practical skills. Unfortunately, practical work in education faces substantial challenges, largely due to misconceptions held by teachers regarding the usefulness of laboratory practices. According to Fernández (2018), this issue arises from educators' tendency to undervalue experimental practices, considering them an excessive investment of time, effort, and resources.

Even when classroom experiments are conducted, they are often limited to mere illustrative exercises that involve following instructions, leading to minimal competency development in students. Additionally, these experiments tend to lack clarity and effectiveness. Similarly, Zorrilla et al. (2020) indicated that this problem is also attributed to the lack or insufficiency of laboratory resources, as well as the absence of practical sessions. As a result, professionals are trained with strong theoretical knowledge but exhibit deficiencies in applying that knowledge in their professional practice.

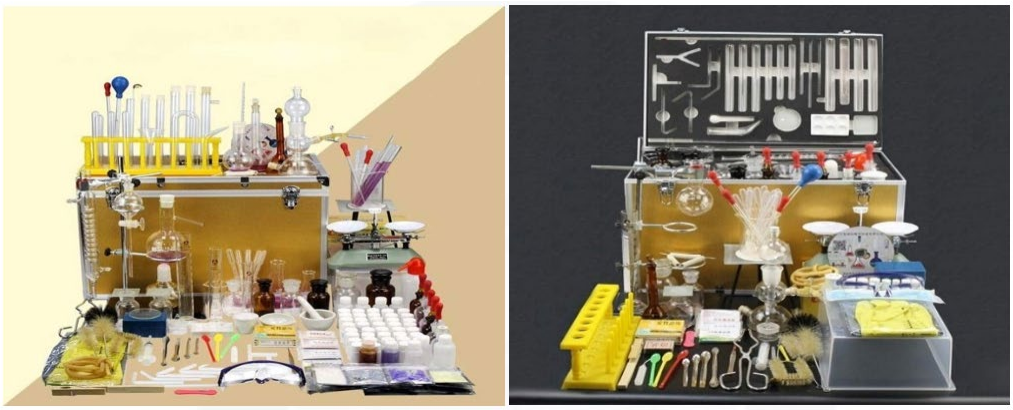
In recent years, there has been growing interest in education regarding the role of EKs in developing students' scientific and practical skills. The COVID-19 pandemic and the expansion of virtual education have further highlighted the importance of EKs, as they allow students to conduct experiments without being physically present in a laboratory. In this regard, López and Tamayo (2012) stated:

"EKs can increase students' engagement and interest in chemistry, as experimental work fosters and promotes science learning. It encourages students to question what they are

learning, allowing them to apply their knowledge and integrate it with experimental work" (p.147).

Figure 1

Experimental Kits Applied to Chemistry.



Nota. Images taken from Amazon.

On the other hand, Espinosa et al. (2016) indicated that incorporating practical work as a teaching-learning strategy facilitates the understanding of concepts, enabling students to analyze and evaluate the entire process to reach precise conclusions by applying scientific and practical criteria.

> Laboratory practices serve as learning spaces where students develop and acquire competencies, establish scientific criteria, verify theoretical concepts, and, most importantly, relate them to prior knowledge (Severiche & Acevedo, 2013, p. 193).

One of the advantages of EKs is their ability to materialize theoretical concepts through practical work, allowing students to understand and apply these concepts tangibly. This promotes a deeper comprehension of chemistry and helps students develop critical and analytical thinking skills, which are essential for success in various academic and professional fields. Additionally, studying chemistry requires students to develop cognitive and conceptual skills. Therefore, this study focused on the use of experimental kits in secondary and higher education levels, as these stages establish the foundation for understanding the scientific world.

Given this context, the present article aims to examine scientific evidence on EKs and their impact on the development of scientific and practical skills in chemistry students at different educational levels. In this regard, the following research questions were formulated:

1. What studies have been conducted on this subject?
2. At which educational levels are laboratory kits most commonly used?
3. What are the most frequently used terms in the reviewed studies?

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

4. What scientific and practical skills do students develop when using experimental kits implemented by teachers?
5. What factors influence the implementation and management of experimental kits?

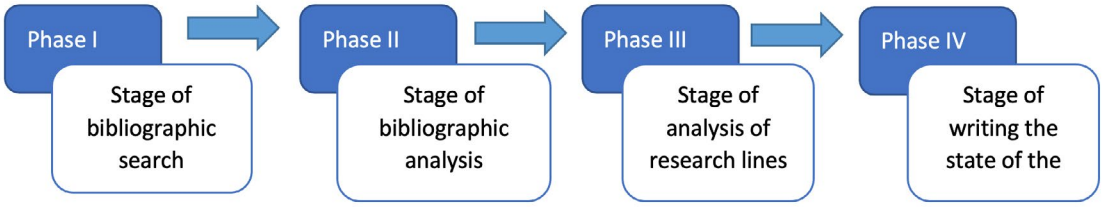
Methodology

This article is based on a systematic literature review and corresponds to an exploratory-descriptive study. According to Sánchez et al. (2022), this methodology aims to "identify, select, evaluate, and synthesize high-impact research evidence transparently and accessibly, responding to a clear and specific research question" (p. 52). The study was conducted following the guidelines of the PRISMA 2020 protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), with the purpose of exploring national and international studies on the integration of experimental kits and their impact on the development of scientific and practical skills in chemistry students.

Furthermore, Page et al. (2021) stated that a systematic review examines current bibliographic trends through a systematic process involving the collection, identification, selection, and evaluation of bibliographic data. This methodology was chosen due to the multiple advantages of systematic reviews, which allow the synthesis of current knowledge in a specific field. The review was carried out in the following phases:

Figure 2

Phases for Knowledge Interpretation.



Note. Phases adapted from León (2013)

Phase I: The heuristic method was employed, through which the "preparation, formulation, and collection of information" was carried out (Vinueza et al., 2022, p. 49). A search was conducted in the Scopus, Google Scholar, and ERIC databases using the following key terms: laboratory kit, experimental kit, educational kit, portable laboratory, chemistry, competencies, skills, practical, and scientific, which were connected using the Boolean operators AND and OR.

Phase II: At this stage, studies that did not meet the research objective were filtered out, leaving only those that would be analyzed in Phases III and IV. To ensure relevance, the following inclusion criteria were established:

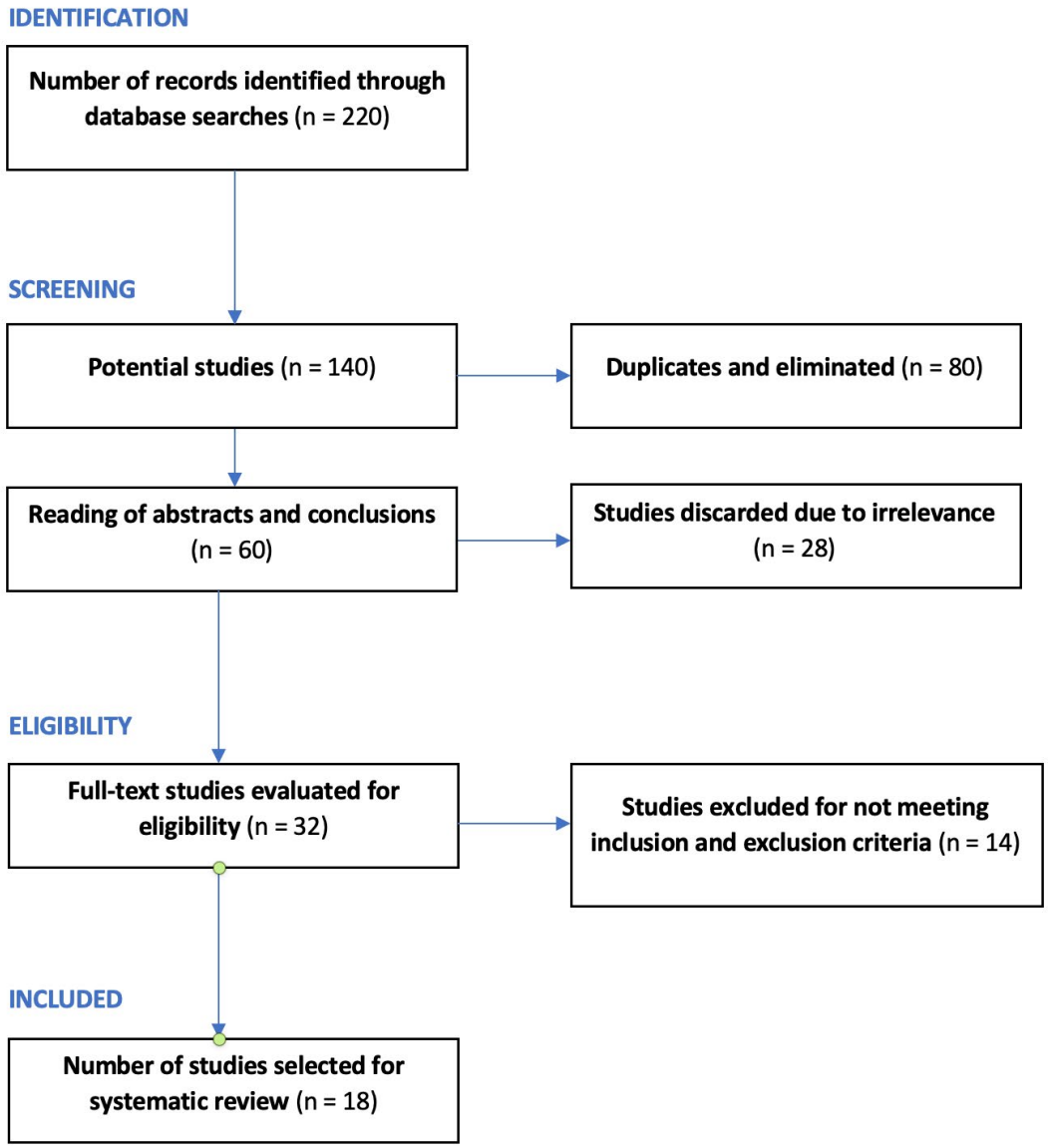
1. Studies published from 2018 onwards
2. Publications in English, Portuguese, or Spanish

3. Works that include experimental kits in Chemistry
4. Studies with a quantitative, qualitative, or mixed approach
5. Sources limited to articles, books, conference papers, and theses

Regarding exclusion criteria, studies that did not address the research topic or failed to meet the inclusion criteria were automatically discarded.

Figure 3

Presents the PRISMA Flow Diagram.



Note. PRISMA Flow adapted from Moher (2009).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

After a rigorous search, 32 studies were identified for potential evaluation. Of these, 14 studies were excluded because they did not match the search period, were in a different language, corresponded to systematic reviews, essays, narratives, or conference presentations, or were unrelated to the field of education. Although some of these studies addressed experimental kits, they were focused on other subjects, such as physics or biology. After this process, 18 publications were selected for the review.

Phase III: After completing Phases I and II, an individual review of the 18 studies was conducted to identify the most relevant concepts and key findings from the authors, incorporating our own analysis.

Phase IV: In the final stage, the hermeneutic method was applied to the 18 selected studies, where they were "interpreted, constructed, and theoretically represented" (Vinueza et al., 2022, p. 49).

Additionally, natural language processing (NLP) techniques such as word cloud generation and frequency diagrams were used to identify the most frequently appearing terms in the abstracts of the selected studies. To ensure consistency in the results, certain terms were standardized, including student/s; competencies/skills; student body, student/s; practical; chemical/s; kit/s; and scientific/s.

Results

Among the eighteen studies selected for review, the majority were fourteen scientific articles: Ambruso & Riley (2022), Amsen (2021), Andrews et al. (2020), Fuangswasdi et al. (2023), De Morais et al. (2021), Ibarra et al. (2020), Kelley (2021), Molina (2018), Nguyen & Keuseman (2020), Samuel (2021), Sukarmin et al. (2020), Toma (2021), Vizcarra Sánchez & Vizcarra Gavilán (2021), and Zohdi & Azmar (2023). Additionally, three published theses were included: Orrego (2020), Urquizo & Poma (2023), and Tejero (2020), along with one digital didactic book by Malanca & López (2020).

In *Figure 3*, the distribution of studies by year shows: seven studies in 2020, six in 2021, three in 2023, and two in both 2018 and 2022. Regarding the methodological approach (*Figure 4*), twelve studies used a quantitative methodology, five followed a qualitative approach, and one used a mixed-methods approach. In terms of educational level, nine studies focused on secondary education, while the other nine were applied at the higher education level.

Figure 4

Tracking of Published Studies by Year.

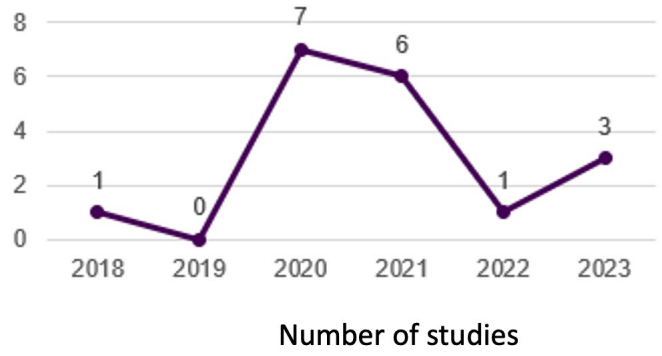
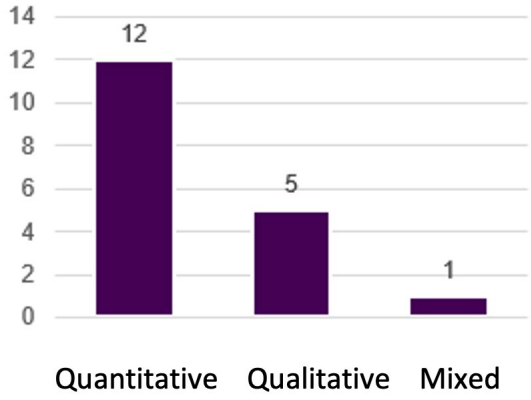


Figure 5

Number of Publications by Their Methodological Nature.



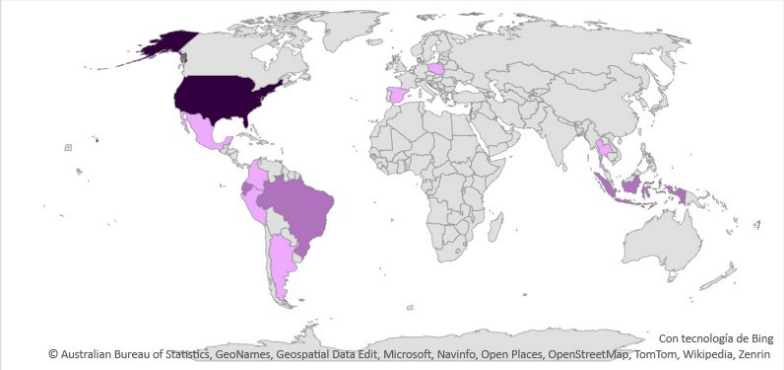
2.2. Geographical Mapping

Regarding the geographical distribution (*Figure 5*), it is observed that the United States has four publications, followed by Brazil, Ecuador, and Indonesia (with a total of six studies); Colombia, Peru, Mexico, Argentina, Spain, Thailand, and Poland (with a total of seven studies). It is also worth mentioning that no information was obtained regarding the country of origin for one study.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 6

Scientific Production on the Use of Visual KE in Different Countries.

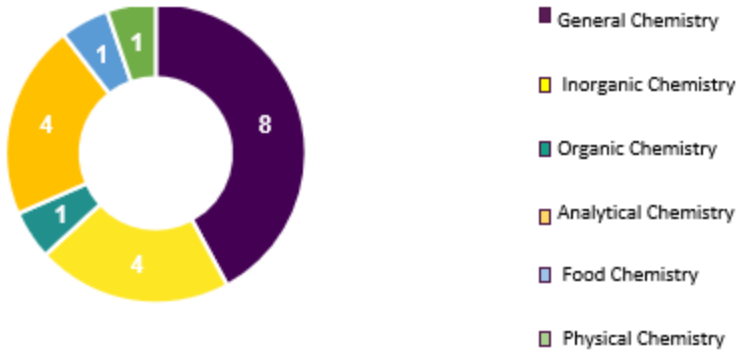


3.3. Distribution of Studies by Areas of Chemistry.

Out of the eighteen studies reviewed, all of them focus on the use of experimental kits, as each analyzed document is based on the use or development of an experimental kit. *Figure 5* details the frequencies, showing that most publications are related to the areas of General Chemistry (n = 8), Inorganic Chemistry (n = 4), Analytical Chemistry (n = 4), Organic Chemistry (n = 1), Physical Chemistry (n = 1), and one study on Food Chemistry (n = 1). It is important to note that some studies addressed more than one of these topics.

Figure 7

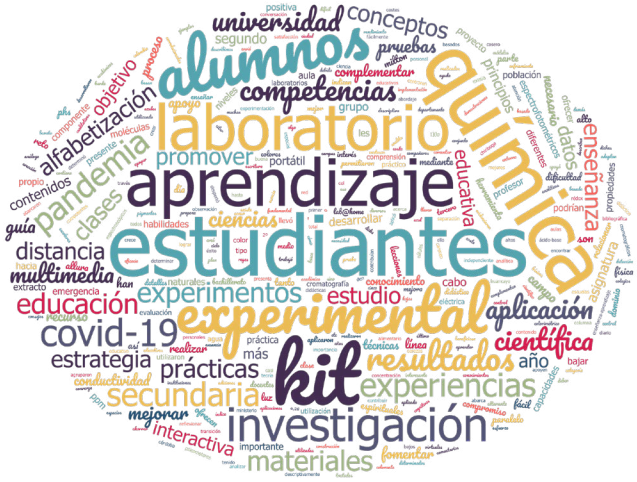
Number of Studies by Areas of Chemistry.



3.4. Frequency of Most Used Terms.

Figure 8

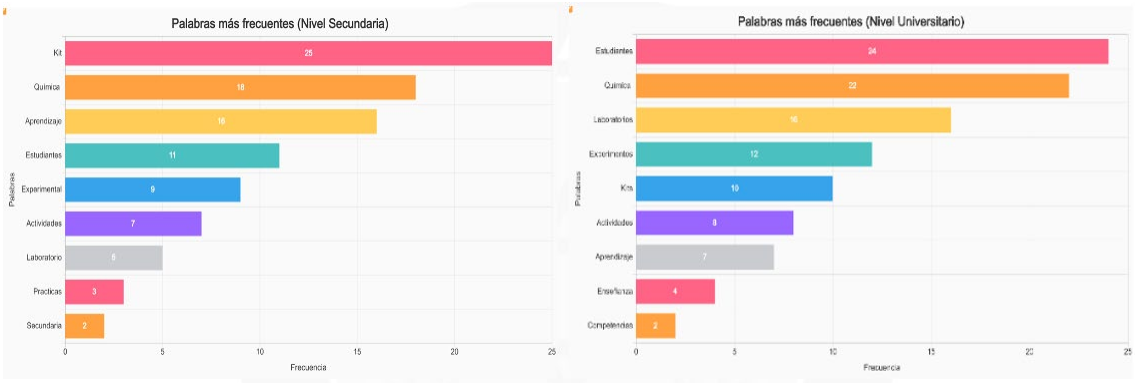
Word Cloud.



Nota: Created based on the abstracts of the reviewed studies.

Figure 9

Most Frequent Words by Educational Levels.



With the aim of identifying the frequency of terms, *Figure 6* highlights the most common words found in the abstracts, such as experimental kits and laboratory kits, along with terms like learning, Chemistry, students, competencies, practices, experimental, and scientific. Similarly, *Figure 7* allows for a comparison of the most frequently used terms at each educational level, confirming that the selection of documents was the most appropriate for the review.

3.5. Experimental Kits (KE) in Chemistry Education.

After analyzing the studies, the findings indicate that experimental kits (KE) can enhance students' motivation and interest in studying chemistry, which in turn leads to greater academic success.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Additionally, KE foster skills such as problem-solving and critical thinking—key elements that facilitate the understanding of science by engaging students in hands-on experiments. This practical involvement allows them to explore and discover new concepts in the field of chemistry. In line with this, *Table 1* presents the most significant findings reported by the authors.

Table 1

Findings on Experimental Kits (KE) in Chemistry.

ID	Authors/Year	Findings
1	Fuangswasdi et al. (2023)	The use of the Lab@Home kit during the COVID-19 pandemic improved students' learning process more efficiently.
2	Andrews et al. (2020)	A significant improvement in General Chemistry learning was observed
3	Toma (2021)	The Chemistry kit had a significant impact on chemistry learning, with an increased student interest, resulting in better comprehension of the topics.
4	Kelley (2021)	The use of the experimental laboratory kit in a home setting proved to be suitable, easy to use, cost-effective, and safe. Additionally, it positively impacted student participation and knowledge acquisition in Organic Chemistry.
5	Ambruso y Riley (2022)	With the use of the home laboratory kit, students were able to discuss and better understand the analytical techniques implemented in the kit, while also reflecting on the
6	Amsen (2021)	The findings indicated that studying Chemistry using a laboratory kit in a remote learning setting presents several challenges. However, numerous methods and resources are currently available to overcome these challenges and strengthen students' knowledge.
7	Ibarra et al. (2020)	In the study, 80% of students successfully separated at least two primary colors through chromatography, demonstrating that experiments can be conducted at home using readily available resources.
8	Orrego y Paullán (2020)	The application of the practice kit increased students' interest in learning Chemistry, promoting cognitive skill development and improving their attitudes.
9	Tejero (2020)	The pH colorimetric kit allowed students to relate pH color changes to theoretical concepts covered in class.
10	Molina (2018)	The implementation of experimental kits improved students' attitudes—an important factor in enhancing Chemistry learning.
11	Sukarmin et al. (2020)	The findings show that the Chemistry kit is a practical route to obtaining valuable learning experiences, in addition to being cost-effective and easy to use for students. Even in virtual education, the kit provides a means for more practical learning and reinforces the hands-on nature of the subject.
12	Malanca y Lopez (2020)	The "*Teaching Science through Experiments*" kit aims to foster scientific knowledge in educational institutions through hands-on experiments. The manual included in the kit provides a wide range of experimental activities to enhance practical learning and skill development in Chemistry.
13	Nguyen y Keuseman (2020)	The study highlights the relevance of integrating experimental activities in the classroom and demonstrates that experiments can be safely conducted at home without the need to purchase expensive laboratory kits.
14	De Morais et al. (2021)	Activities carried out with the mobile water analysis kit (H2O) highlight the importance of experimental work in Chemistry. The results indicated that students were more motivated by the didactic strategy, leading to more meaningful learning.

15	Urquizo y Poma (2023)	The results show that the experimental kit positively impacts and improves Chemistry academic performance, while also motivating students to develop cognitive, scientific, and practical skills.
16	Vizcarra y Vizcarra (2021)	The implementation of a portable laboratory improved the academic performance of the experimental group (tc: 5.805, p-value < 0.01), demonstrating that the portable lab is a valuable resource that supports Chemistry learning and encourages systematic and contextualized study.
17	Samuel (2021)	Student learning increased following the intervention with the kit. Additionally, students reported that it was an effective tool for enriching their learning experience.
18	Zohdi y Azmar (2023)	The results indicated that the development of modules supported by the kit is highly beneficial in enhancing students' scientific skills. It also promotes psychomotor, cognitive, and spiritual outcomes for students.

3.6. Practical and Scientific Skills Acquired through Experimental Kits (KE).

According to Herrera and Córdoba (2023), the acquisition of skills "is fundamental in the new educational approach, referring to them as a set of abilities that teachers use to maximize their students' potential" (p. 4).

Martín et al. (2019) define a practical skill as the ability to design, conduct, and analyze experiments, using techniques and tools to collect empirical data through the proper handling of instruments and the rigorous execution of experimental procedures.

On the other hand, a scientific skill encompasses the ability to understand and apply theoretical principles and concepts in the scientific field, including hypothesis formulation, interpretation of experimental results, and communication of findings through scientific writing (García & Moreno, 2020).

Scientific Skills

- Interpretation of data obtained from experiments.
- Ability to follow instructions through experimental protocols.
- Accuracy and comprehension of results in experiments.
- Knowledge of laboratory safety rules.
- Skill in problem-solving and acting independently in a remote setting.
- Data processing, including the use of statistical tests.
- Understanding the phases of chromatography.
- Integration of chromatography theoretical concepts into practical experiments.
- Understanding the principles of separation and analysis through chromatography.
- Application of theoretical concepts in practical laboratory contexts.
- Observation of the stability of pigment solutions under different conditions, such as color variations and degradation over time.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

- Interpretation of collected data and extraction of conclusions from experimental results

Practical Skills

- Proper planning and design of experiments.
- Handling of laboratory equipment and application of experimental methods.
- Observation of chemical and physical changes in experiments.
- Analysis of qualitative and quantitative data using techniques such as fluorescence cooling, reverse-phase chromatography, absorption spectroscopy, and Brownian motion.
- Use of experimental methods to determine analyte concentrations in samples.
- Mastery of pipette handling, liquid pouring, and reading specialized equipment.
- Problem-solving in the laboratory when issues arise.
- Adaptation of laboratory techniques to different settings.
- Selection of materials and reagents for experiments.
- Application of extraction techniques to separate pigments.
- Interpretation of experimental results and formulation of questions.
- Application of laboratory techniques in a home setting.
- Presentation of results and procedures through laboratory reports.
- Adaptability to conduct scientific experiments without access to specialized equipment or instruments.

3.7. Factors Associated with Implementation.

Socioeconomic Factors

According to Agualongo and Garcés (2020), the socioeconomic factor in both developed and developing countries affects education quality in various ways, including low enrollment rates, academic achievement, and high dropout rates.

Regarding design, the costs of production and maintenance vary significantly depending on the type and complexity of each kit. In terms of costs, countries such as the United States, Ecuador, Peru, and Brazil acknowledge the efforts of educators in developing Experimental Kits (KE), which require purchasing equipment, instruments, materials, and necessary reagents—expenses that can be significant for advanced or specialized kits. Figures 8A and 8B illustrate some examples of KE that required financial resources for their development.

In contrast, in countries such as Colombia, Argentina, and Ecuador, some kits have been made using easily accessible materials found in supermarkets or pharmacies (Figures 8C and 8D). Examples include everyday reagents such as salt (NaCl), sugar ($C_{12}H_{22}O_{11}$), baking soda ($NaHCO_3$),

alcohol (both ethyl and pharmaceutical), hydrogen peroxide, drain cleaner (NaOH), plant extract indicators, plastic cups, bottles, containers, droppers, and other common items.

Figure 10

Examples of Experimental Kits Observed in the Studies.

a. Laboratorios portátiles Vizcarra y Vizcarra (2021)

b. Kits experimentales Urquizo y Poma (2023)

c. Laboratorios portátiles Molina (2018)

d. Kits experimentales (Química), Fuangswasdi et al. (2023)

Additionally, maintenance involves ongoing expenses to replace worn components, replenish consumables, and make necessary repairs to ensure that the equipment functions properly. These costs can increase over time, especially if the kits are frequently used by large groups of students. Furthermore, schools may need to invest in teacher training to ensure the proper and safe use of KE, adding another layer of costs.

The combination of these factors can represent a significant financial burden for educational institutions with limited resources, affecting their ability to provide high-quality, hands-on education equitably.

Educational Plans

Several factors can affect the efficiency of KE in the teaching process, including:

- Resistance to change from teachers and school administrators.
- Lack of financial and technological resources.
- Differences in teacher training and professional development.
- The challenge of adapting curricula to local contexts while meeting standardized educational policies.

In Colombia and Mexico, despite government efforts to incorporate KE into public schools, these programs often struggle with sustainability and accessibility due to a lack of funding and ongoing support. These challenges are more pronounced in economically disadvantaged areas, where structural limitations and the digital divide hinder equitable implementation of pedagogical innovations (Meroni et al., 2015).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

For example, in Peru, Vizcarra Sánchez and Vizcarra Gavilán (2021) highlighted that their study identified a lack of laboratories and resources, making it impossible for students to develop experimental skills. As a result, teachers are limited to theoretical instruction, without the practical component. Similarly, in Ecuador, Urquizo and Poma (2023) found that limited laboratory practices and the absence of a fully equipped physical laboratory restrict students from strengthening their practical skills and competencies. This limitation hinders experimental learning, making chemistry seem like a monotonous and difficult subject.

In contrast, in countries like the United States and Poland, the implementation of KE is more aligned with established educational plans due to greater financial resources. In the United States, schools have larger budgets and specific funding programs that facilitate the acquisition and maintenance of KE, as well as continuous teacher training for their proper use.

Poland, although it does not have the same level of resources as the United States, has successfully integrated KE into its educational system through well-structured educational policies and a focus on modernizing science teaching (Ponce, 2010).

These examples highlight the importance of considering the socioeconomic context and educational policies when evaluating the implementation of KE, as they directly influence the quality and equity of practical science education for students.

Findings and Conclusions on Experimental Kits (KE)

The results showed that experimental kits are ideal resources for fostering the development of practical and scientific skills, providing a relevant and meaningful learning experience. These kits not only help students understand theoretical concepts but also enable them to apply them in practical processes. These findings support the idea proposed by Veitia et al. (2022) that the integration of experimental work provides a solid foundation for carrying out concrete actions, analyzing data, evaluating hypotheses, and planning experiments—ultimately enhancing scientific knowledge and learning.

This approach offers a more contextualized learning experience, better preparing students to tackle future scientific challenges. Our findings align with those of Molina et al. (2016) and Martin et al. (2019), who emphasized the importance of experimental kits in the development of practical skills for studying science, particularly chemistry. These resources facilitate the acquisition of skills such as:

- Measuring volumes
- Designing and assembling equipment
- Identifying substances
- Separating compounds based on their chemical and physical properties

Through this systematic review, it is evident that KE play a crucial role in education. According to Dickerson et al. (2014), using these kits can enhance students' understanding of scientific

phenomena and chemical concepts, as well as improve their academic performance through exploration, experimentation, and critical thinking.

Similarly, Foley et al. (2013) stated that integrating KE enhances student motivation and interest in learning chemistry. By actively participating in experiments and observing the results of their investigations, students experience greater success and curiosity, making their learning process more engaging and enriching.

Additionally, Kennepohl (2007) argued that the at-home experience with KE is comparable to traditional laboratory experiences. Urquizo & Poma (2023) and Vizcarra Sánchez & Vizcarra Gavilán (2021) also highlighted that KE are feasible tools for teaching as they complement classroom instruction and motivate students by improving cognitive and practical skills.

However, financial barriers remain a challenge for educational institutions. To ensure equal access, institutions should consider solutions such as:

- Government subsidies
- Partnerships with non-governmental organizations (NGOs)
- Creating loan programs for experimental kits

This would ensure that all students, regardless of their economic background, can benefit from these valuable learning tools. Moreover, it is crucial to promote investment in science education at the political and community levels to bridge resource gaps and make KE accessible to all students, rather than limiting them to well-funded institutions (Arjona et al., 2022; Bonilla et al., 2022).

In light of these challenges, strategic approaches tailored to the realities of developing countries are proposed. These include:

- Public-private partnerships to fund the acquisition of kits
- Continuous training programs for teachers
- Adapting KE to locally available resources

Such strategies aim to ensure that all students, regardless of their socioeconomic status, have access to a high-quality practical education, enabling them to develop strong scientific skills (Bonilla et al., 2022).

Conclusiones

Valuable information was gathered on laboratory kits, confirming that they are essential resources for acquiring practical and scientific skills. These skills include:

- Handling laboratory instruments and equipment
- Employing experimental techniques

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

- Managing chemical substances
- Observing chemical and physical changes in experiments
- Analyzing qualitative and quantitative data
- Applying methods to identify analytes
- Adapting and applying experimental techniques in non-traditional settings (e.g., at home)
- Following experimental instructions and protocols
- Ensuring precision and comprehension of experimental results
- Fostering scientific curiosity and investigative skills in students

In the 18 studies reviewed between 2018 and 2023, laboratory kits were found to significantly contribute to educational advancement by developing both practical and scientific skills in students. Most studies focused on areas such as physical chemistry, organic chemistry, and food chemistry. The most frequently used terms identified in the research were: Chemistry, experimental kit, laboratory kit, students, skills, practical, and scientific. Additionally, it was determined that half of the studies were conducted in higher education, while the other half focused on secondary education (high school).

The implementation of experimental kits (KE) in educational settings has been deeply influenced by socioeconomic factors and educational planning. The reviewed studies highlighted that the costs associated with the creation, maintenance, and teacher training for KE vary significantly depending on the country and its level of economic development.

- In developed countries like the United States, the availability of financial resources facilitates the integration of KE into educational programs, contributing to a high-quality, practical education.
- In developing countries or those with limited resources, such as Colombia, Peru, and Ecuador, financial constraints and inadequate infrastructure hinder the effective implementation of KE, resulting in a more theoretical and less practical education, which negatively impacts learning quality.

Finally, experimental kits stand out for their versatility, as they can be adapted to a wide range of experiments and activities, enhancing the learning experience. Their portability allows for use in any location, and their simplicity enables students to quickly familiarize themselves with experimental procedures and techniques. Furthermore, their low maintenance cost makes them an affordable alternative for educational institutions with limited resources, ensuring greater accessibility to hands-on scientific learning.

References

Agualongo, D. y Garcés, A. (2020). El nivel socioeconómico como factor de influencia

en temas de salud y educación. *Revista Vínculos*, 5(2), 19-27. https://doi.org/10.24133/vinculosespe.v5i2.1639

Aliaga, F., De la Rosa, L., Baracaldo, P., y Romero, L. (2022). Dificultades y desafíos de integración de los estudiantes venezolanos en Colombia desde la voz de sus docentes. *Foro de Educación*, 20(2), 159–184. https://dialnet.unirioja.es/servlet/articulo?codigo=8711496

Ambruso, K. y Riley, K. (2022). At-Home Laboratory Experiments for the Analytical Chemistry Curriculum. *Journal of Chemical Education*, *99*(2), 1125–1131. https://doi.org/10.1021/acs.jchemed.1c00943

Amsen, E. (2021). Teaching Chemistry Labs from a Distance. *ACS Central Science*, *7*(5), 702–705. https://doi.org/10.1021/acscentsci.1c00539

Andrews, J., de Los Rios, J., Rayaluru, M., Lee, S., Mai, L., Schusser, A., y Mak, C. (2020). Experimenting with At-Home General Chemistry Laboratories During the COVID-19 Pandemic. *Journal of Chemical Education*, *97*(7), 1887–1894. https://doi.org/10.1021/acs.jchemed.0c00483

Arjona, M., López, A., y Maldonado, E. (2022). Los sistemas de gestión de la calidad y la calidad educativa en instituciones públicas de Educación Superior de México. *Retos*, *12*(24), 268–283. https://doi.org/10.17163/ret.n24.2022.05

Bonilla, S., Barbecho, N., y Coronel, C. (2022). Calidad educativa en el Ecuador: un estudio bibliométrico. *TRASCENDER, CONTABILIDAD Y GESTIÓN*, *7*, 126–142. https://doi.org/10.36791/tcg.v7i21sept-dic.184

De Morais, L., Sousa, A., Oliveira, J., y Coelho, R. (2021). Utilização do kit móvel de análise de água como ferramenta de ensino para conteúdo de Química do 2ºANO do ensino médio. *Brazilian Journal of Development*, *7*(1), 6178–6191. https://doi.org/10.34117/bjdv7n1-420lla

Dickerson, D., Stewart, C., Hathcock, S., y McConnell, W. (2014). The Nature and Role of Science Kits in Affecting Change in Public Attitude Toward Understanding of Science. En L. Tan Wee Hin y R. Subramaniam (Eds.), *Communicating Science to the Public* (pp. 47–62). Springer Netherlands. https://doi.org/10.1007/978-94-017-9097-0_4

Espinosa, E., González, K., y Hernández, L. (2016). Las prácticas de laboratorio: una estrategia didáctica en la construcción de conocimiento científico escolar. *Entramado*, *12*(1). https://doi.org/10.18041/entramado.2016v12n1.23125

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Farina, J., del Greco, D., Guerra, R., y Concari, S. (2019). Competencias y Problemas experimentales en prácticas de laboratorio. *Revista De Enseñanza De La Física*, *31*, 311–318. https://revistas.unc.edu.ar/index.php/revistaEF/article/view/26583

Fernández, N. (2018). Actividades prácticas de laboratorio e indagación en el aula. *Tecné, Episteme y Didaxis: TED*, (44), 203–218. https://bit.ly/43paE72

Foley, J., Bruno, B., Tolman, R., Kagami, R., Hsia, M., Mayer, B., y Inazu, J. (2013). C-MORE Science Kits as a Classroom Learning Tool. *Journal of Geoscience Education*, *61*(3), 256–267. https://www.researchgate.net/publication/279533038_C-MORE_science_kits_as_a_classroom_learning_tool

Fuangswasdi, S., Aeungmaitrepirom, W., Nilsom, V., Ralakhee, P., y Puthongkham, P. (2023). From In-Class Experiments to Lab@Home for General Chemistry Laboratory: Hands-On Experiences During the Pandemic Lockdown. *Journal of Chemical Education*, *100*(2), 655–663. https://doi.org/10.1021/acs.jchemed.2c00853

García, A. y Moreno, Y. (2020). La experimentación en las ciencias naturales y su importancia en la formación de los estudiantes de básica primaria. *Bio-Grafía, 13*(24). https://dialnet.unirioja.es/servlet/articulo?codigo=7565191

Herrera, C. y Córdoba, D. (2023). Competencias Científicas y Tecnológicas en el Trabajo Práctico Experimental de Electricidad. *Revista Multi-Ensayos*, *9*(17), 3–18. https://doi.org/10.5377/multiensayos.v9i17.15737

Ibarra, T., Delgado, C., Oviedo, F., Pérez, J., Rivas, V., Waksman, N., y Pérez, L. (2020). Setting Up an Educational Column Chromatography Experiment from Home. *Journal of Chemical Education*, *97*(9), 3055–3059. https://doi.org/10.1021/acs.jchemed.0c00532

Jones, G., Robertson, L., Gardner, G., Dotger, S., y Blanchard, M. (2012). Differential Use of Elementary Science Kits. *International Journal of Science Education*, *34*(15), 2371–2391. https://doi.org/10.1080/09500693.2011.602755

Kelley, E. (2021). Sample Plan for Easy, Inexpensive, Safe, and Relevant Hands-On, At-Home Wet Organic Chemistry Laboratory Activities. *Journal of Chemical Education*, *98*(5), 1622–1635. https://doi.org/10.1021/acs.jchemed.0c01172

Kennepohl, D. (2007). Using home-laboratory kits to teach general chemistry. *Chemestry Education Research and Practice*, *8*(3), 337–346. https://doi.org/10.1039/B7RP90008B

León, A. (2013). *Cómo Hacer un Estado de la Cuestión* [hoja informativa]. Repositorio Digital. https://reunir.unir.net/handle/123456789/1187

López, A. y Tamayo, Ó. (2012). Las prácticas de laboratorio en la enseñanza de las ciencias naturales. *Revista Latinoamericana de Estudios Educativos (Colombia)*, *8*, 145–166. https://www.redalyc.org/articulo.oa?id=134129256008

Malanca, F. y López, M. (2020). *Kit educativo de Química: enseñar ciencia a partir de experimentos*. Ministerio de Ciencia y Tecnología. http://hdl.handle.net/11336/126601

Marín, M. (2020). El trabajo práctico de laboratorio en la enseñanza de las ciencias naturales: una experiencia con docentes en formación inicial. *Tecné, Episteme y Didaxis: TED*, (49), 163–182. https://doi.org/10.17227/ted.num49-8221

Martín, J., Lorenzo, J., y Valcárcel, N. (2019). Formación de habilidades de la Física en estudiantes de Agronomía. *Mendive: Revista de Educación*, *16*(2), 204–221. https://mendive.upr.edu.cu/index.php/MendiveUPR/article/view/1326

Meroni, G., Copello, M., y Paredes, J. (2015). Enseñar química en contexto. Una dimensión de la innovación didáctica en educación secundaria. *Educación Química, 26*(4), 275–280. https://doi.org/10.1016/j.eq.2015.07.002

Moher, D., Liberati, A., Tetzlaff, J., y Altman, D. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ, 339*. https://doi.org/10.1136/bmj.b2535

Molina, M. (2018). Uso de kits experimentales para mejorar las actitudes y bajar la repitencia en Química General. *Entre Ciencia e Ingeniería*, *12*(24), 89–95. https://doi.org/10.31908/19098367.3817

Molina, M., Palomeque, L., y Carriazo, J. (2016). Experiencias en la enseñanza de la química con el uso de kits de laboratorio. *Entre Ciencia e Ingeniería*, *10*(20), 76–81. https://bit.ly/3oizG9A

Nguyen, J., y Keuseman, K. (2020). Chemistry in the Kitchen Laboratories at Home. *Journal of Chemical Education*, *97*(9), 3042–3047. https://doi.org/10.1021/acs.jchemed.0c00626

Orrego, M. y Paullán, C. (2020). *Implementación de un kit de prácticas de laboratorio para el Desarrollo del aprendizaje de la química con estudiantes de Primero de BGU de la unidad educativa capitán Edmundo Chiriboga, Período septiembre 2019-marzo 2020* [Tesis de grado, Universidad nacional de Chimborazo]. Repositorio Institucional. http://dspace.unach.edu.ec/handle/51000/7043

Page, M., McKenzie, J., Bossuyt, P., Boutron, I., Hoffmann, T., Mulrow, C., Shamseer, L., Tetzlaff, J., AKE, E., Brennan, S., Chou, R., Glanville, J., Grimshaw, J., Hróbjartsson, A., Lalu, M., Li, T., Loder, E., Mayo, E., McDonald, S., … Alonso, S. (2021). Declaración PRISMA 2020: una guía actualizada para la publicación de revisiones sistemáticas. *Revista Española de Cardiología*, *74*(9), 790–799. https://doi.org/10.1016/j.recesp.2021.06.016

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Pastor, C., Aranes, F., Datukan, J., Duad, V., Bantang, J., Espinosa, A., Garcia, N., Marasigan, A., Camacho, V., y Roque, A. (2015). Initial Validation of the Chemistry MicroLab Kit (Chem. Î¼Lab Kit) in Facilitating Learning of Selected Chemistry Concepts for K-12 Science. *The Normal Lights,* 9(2). https://doi.org/10.56278/tnl.v9i2.131

Ponce, J. (2010). *Políticas educativas y desempeño: una evaluación de impacto de programas educativos focalizados en Ecuador*. FLACSO.

Samuel, K. (2021). Chemistry-kit as an Intervention Tool in Emergency Education in Secondary Schools. *International Journal of Pedagogy, Innovation and New Technologies, 8*(1), 72–80. https://doi.org/10.5604/01.3001.0014.9142

Sánchez, S., Pedraza, I., y Donoso, M. (2022). ¿Cómo hacer una revisión sistemática siguiendo el protocolo PRISMA? *Bordón. Revista de Pedagogía*, *74*(3), 51–66. https://doi.org/10.13042/Bordon.2022.95090

Sandoval, M., Mandolesi, M., y Cura, R. (2013). Estrategias didácticas para la enseñanza de la química en la educación superior. *Educación y Educadores*, *16*(1), 126–138. http://www.scielo.org.co/pdf/eded/v16n1/v16n1a08.pdf

Severiche, C. y Acevedo, L. (2013). Las prácticas de laboratorio en las ciencias ambientales. *Revista Virtual Universidad Católica Del Norte*, *3*(40), 191–203. https://bit.ly/3PZEjRc

Sukarmin, S., Poedjiastoeti, S., Novita, D., Lutfi, A., y Susanti, L. (2020). Implementation of Interactive Multimedia and Kit with Writing-to-Learn Strategy on the Chemistry in Daily Life Topic for Junior High School with Disabilities. *Proceedings of the 7th Mathematics, Science, and Computer Science Education International Seminar, MSCEIS 2019, 12 October 2019, Bandung, West Java, Indonesia*. https://doi.org/10.4108/eai.12-10-2019.2296331

Tejero, M. (2020). *Elaboración de un kit colorimétrico de ph a partir del extracto violeta de la col lombarda; estudio de propiedades químico-físicas de estos pigmentos* [Tesis de grado, Universidad de Zaragoza]. Repositorio Institucional. https://zaguan.unizar.es/record/97866/files/TAZ-TFG-2020-3653.pdf?version=1

Toma, H. (2021). Microscale Educational Kits for Learning Chemistry at Home. *Journal of Chemical Education*, *98*(12), 3841–3851. https://doi.org/10.1021/acs.jchemed.1c00637

Turcio, D. y Palacios, J. (2015). Experiencias en la enseñanza experimental basada en competencias. *Educación Química*, *26*(1), 38–42. https://doi.org/10.1016/S0187-893X(15)72096-3

Urquizo, E. y Poma, G. (2023). *Implementación del Laboratorio Portátil para el aprendizaje experimental de Química, con estudiantes de segundo año de Bachillerato de la Unidad Educativa Milton Reyes* [Tesis de grado, Universidad Nacional del Chimborazo]. Repositorio Institucional de la UNACH. http://dspace.unach.edu.ec/handle/51000/11569

Veitia, I., Machado, E., y Seijo, M. (2022). Las tareas experimentales en la enseñanza de la Química. Una experiencia valiosa. *Nueva Educación Latinoamericana*, (7), 78–87. https://bit.ly/3rtgXJK

Vinueza, D., Cuasque, M., y Imba, K. (2022). Estado del Arte. Investigación formativa en la Educación Superior. *Ecos de La Academia*, *8*(15), 45–54. https://doi.org/10.53358/ecosacademia.v8i15.681

Vizcarra Sánchez, Y. y Vizcarra Gavilán, A. (2021). El laboratorio portátil: herramienta efectiva de enseñanza de la química en entornos rurales. *Educación Química*, *32*(2), 37. https://doi.org/10.22201/fq.18708404e.2021.2.72724

Zohdi, A. y Azmar, A. (2023). Supporting Students' Scientific Literacy Skills Through an Experimental KIT Module Based On Al-Quran Studies. *Jurnal Penelitian Pendidikan IPA, 9*(5), 3780–3789. https://doi.org/10.29303/jppipa.v9i5.3575

Zorrilla, E., Quiroga, D., Morales, L., Mazzitelli, C., y Maturano, C. (2020). Reflexión sobre el trabajo experimental planteado como investigación con docentes de Ciencias Naturales. *Ciencia, Docencia y Tecnología*, *31*(60), 266–285. https://doi.org/10.33255/3160/626

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1284 • e-ISSN: 2631 - 2786

Social conflicts and mediation in Ecuador's public sector: a multidisciplinary approach

Los conflictos sociales y la mediación en el sector público del Ecuador: un enfoque multidisciplinar

Date of receipt: 2024-05-03 • Date of acceptance: 2024-09-21 • Date of publication: 2025-01-10

Jeanette Jordán Buenaño [1]
Universidad Técnica de Ambato, Ecuador
je.jordan@uta.edu.ec
https://orcid.org/0000-0002-0490-7975

Santiago Vayas Castro [2]
Universidad Técnica de Ambato, Ecuador
gs.vayas@uta.edu.ec
https://orcid.org/0000-0003-0504-0864

Álvaro Jiménez Sánchez [3]
Universidad de Valladolid, España
alvarojs@uva.es
https://orcid.org/0000-0002-4249-8949

Abstract

Over the last four decades, Ecuador has experienced a series of social, economic, and political conflicts that have significantly affected the well-being of its population due to governmental decisions, natural disasters, and structural problems such as unemployment, poverty, and transnational crime. This research analyzes social conflicts in the public sector and the involvement of mediation in the branches of government. The approach applied was descriptive and qualitative to identify trends and emerging conflicts, as well as prospective research to understand the history of conflicts and the evolution of mediation. Finally, statistics on mediation in the public sector were analyzed to assess its effectiveness and scope. The results highlight the need to implement mediation as a state policy to effectively address conflicts and promote social cohesion. Although mediation has been used in the judicial sphere, its application in other branches of government and in society, in general, is limited. However, there is an increase in the use of mediation in the public sector, suggesting a growing recognition of its effectiveness in conflict resolution, promoting a culture of peace and peaceful coexistence..

Keywords: Mediation, conflict, policies, culture of peace, social cohesion, public sector

Resumen

Durante las últimas cuatro décadas, Ecuador ha experimentado una serie de conflictos sociales, económicos y políticos que han afectado significativamente el bienestar de su población, debido a decisiones gubernamentales, desastres naturales y problemas estructurales como el desempleo, la pobreza y la delincuencia transnacional. Esta investigación analizó los conflictos sociales en el ámbito público y la participación de la mediación en los poderes del Estado. El enfoque aplicado fue el descriptivo y cualitativo para identificar tendencias y conflictos emergentes, así como el estudio prospectivo para entender la historia de los conflictos y la evolución de la mediación. Finalmente, se analizaron estadísticas de mediación en el sector público para evaluar su efectividad y alcance. Los resultados evidenciaron la necesidad de implementar la mediación como una política estatal para abordar los conflictos de manera efectiva y promover la cohesión social. Aunque la mediación se ha utilizado en el ámbito judicial, su aplicación en otros poderes del Estado y en la sociedad en general es limitada. Sin embargo, se observa un aumento en el uso de la mediación en el sector público, lo que sugiere un reconocimiento creciente de su eficacia en la resolución de conflictos como cultura de paz y la convivencia pacífica.

Palabras clave: Mediación, conflicto, políticas, cultura de paz, cohesión social, sector público

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

The economic, political, and social decisions made by governments in recent decades have had a significant impact on the well-being of their inhabitants. Recurring social conflicts in Ecuador have been characterized by armed conflict, power struggles, delayed approval of migration policies, transnational terrorism, and drug trafficking (Unda, 2020), as well as the influence of external agents such as natural disasters. In this context, the crisis and social challenges highlight the need to implement mediation in public institutions as part of a vitally important and lasting state policy, contributing to social cohesion that would improve the current situation.

Existing programs promoting mediation have not been sufficient to comprehensively address conflicts between the government and citizens, as mediation is limited solely to the judiciary and its agencies, neglecting the executive, legislative, and electoral branches, as well as transparency and social oversight. Furthermore, the challenges of combating unemployment, poverty, and crime act as catalysts for discord and social unrest.

In this context, incorporating mediation as a tool to strengthen social cohesion is important for promoting peace justice. Mediation is presented as a collaborative approach to reaching mutually beneficial agreements, emphasizing the importance of dialogue and the pursuit of common interests (Bush and Folger, 1994). Both authors emphasized that this method can transform conflicts by focusing on the underlying needs and concerns of the parties involved, rather than simply imposing external solutions.

1.1. Social conflicts and governance in the political and legal framework.

Social conflicts vary in nature and severity, but do not necessarily involve hostility or violence in all situations. These conflicts are diverse in terms of causes, duration, resolution, outcomes, and effects (Kriesberg, 1973), and their perception can vary according to different points of view, being considered necessary, admirable, regrettable, or unjust.

Conflicts seek to modify public decisions or promote new policies, in many cases influencing government regulations, administrative processes, or rules that affect the entire population. Therefore, public decisions can cause conflicts (Huamani and Macassi, 2022). However, public policies can offer meaningful and lasting solutions to the problems underlying these conflicts (Roth, 2019) and establish social order by offering a specific solution to the problem through agreements and consensus that are effective and efficient for the parties.

It's reasonable for each government to have a distinct vision and perception of governance, which is reflected in the policies and regulations it issues; however, societal satisfaction can be perceived as invasive and non participatory, which demotivates and delegitimizes civil society.

Governance within the Ecuadorian political and legal framework began to develop after the return to democracy in 1980, when inflation, the crisis, and economic policy focused on the fiscal deficit, aggravated by the 1981 war under President Hurtado and continued under Febres

Cordero in 1985. As a result of these events, structural adjustment policies were implemented to stabilize the country's economy, although these macroeconomic measures were considered late and inconsistent. In 1984, due to the turbulent economic, political, and social crisis, the first international emigration occurred, mostly from the province of Azuay, representing the largest influx until the late 1990s. At that time, there were no regulations or immigration policies to support Ecuadorians abroad (Herrera, 2022).

In 1992, President Rodrigo Borja faced one of the historic challenges of the Indigenous uprising, which went unrepressed, and opened the first channels of dialogue and negotiation through the Catholic Church. The consensus was achieved with the granting of property titles to Indigenous lands and providing the organizations gathered in CONAIE with the appropriate infrastructure to facilitate their meetings (Ortiz, 2015).

From 1992 to 1996, Sixto Durán-Ballén governed amid the "Flowers and Honey" scandal, in which the National Finance Corporation granted loans to the president's relatives without verifying their credit history. Over the next seven years, Ecuador went through five different presidents: Abdala Bucaram, Fabián Alarcón, Rosalía Arteaga, Jamil Mahuad, and Lucio Gutiérrez. This instability was due to oppressive measures and cases of corruption that fostered the emergence and strengthening of movements demanding their rights (Sánchez, 1996).

In 1998, the El Niño phenomenon and the Bahía de Caráquez earthquake further complicated the country's economic and social situation. Preventive health policies were created to mitigate the damage (Ministry of Public Health and Pan American Health Organization, 2000). This dire situation placed Ecuador as the fifth poorest country in Latin America, where more than half of the Andean population lived in extreme poverty (Hung-Hui, 2008).

The ousting of Jamil Mahuad's government on January 21, 2000, in a coup d'état, was prompted by intense popular protests against the economic measures implemented, such as dollarization and the freezing of bank accounts. These measures deprived many citizens of access to their savings, causing uncertainty and distrust in the financial system.

Faced with this situation, a second wave of massive international migration occurred, the result of the country's worst historical crisis beginning in 1999. With the growing emigration, the first migration policies for Ecuadorians abroad were established, with an emphasis on migrant rights and ties (Herrera, 2022). Remittances sent by Ecuadorians were the second source of foreign currency income for the country. With dollarization in place since January 9, 2000, remittances amounted to $1,316.7, surpassing even oil in income for the country and thus becoming one of the most important items, above bananas, shrimp, coffee, and cocoa (Central Bank of Ecuador, 1999-2000).

With dollarization, Ecuador adopted a different regime for the economic transformation of its monetary system, including changes in the country's tax and financial policies. These legal and institutional reforms consolidated the dollarization process with the Law for the Economic Transformation of Ecuador, issued on March 13, 2000 (Central Bank of Ecuador, 2001). Following

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

this crisis, subsequent administrations focused on raising the standard of government policies related to fiscal policy and structural reforms.

From 2007 to 2017, Rafael Correa's administration experienced several political disputes that became polarized over the years, with criticisms turning into attacks and a rift between supporters and opponents of Correa's administration, which generated divisions among social movements. Likewise, the discourse on social justice was reinforced in the weekly Saturday press conferences. Social protests were characterized by a strategy of confrontation in the streets, organizing sit-ins, vigils, and counter-marches in response to demonstrations by opposing factions.

Among the measures imposed were the prohibition on inheritance and gratuitous donations, which was composed of seven scales for tax payments, the issuance of Decree No. 16 regulating the creation of a unified information system for social and citizen organizations to oversee their formation and operation, and the elimination of the 40% contribution to IESS retirement pensions, which sparked protests among the affected sectors.

In 2016, a magnitude 7.8 earthquake struck Ecuador's northern coast, leaving hundreds of people affected. In response to this situation, the Organic Law of Solidarity and Citizen Co-responsibility for the Reconstruction and Reactivation of the Areas Affected by the Earthquake was enacted. This law sought to collect one-time solidarity contributions divided into different categories, such as salaries, assets, profits, and real estate. However, the implementation of reconstruction and productive reactivation policies was questioned due to its slow pace and concerns about latent corruption.

During Lenin Moreno's term between 2017 and 2021, he faced multiple political and social crises, including the controversial implementation of Decree 883 in 2019, which allowed for fuel price increases. This measure sparked protests and opposition from various social sectors, including Indigenous peoples, leading the government to call for dialogue. Mediation by UN representatives facilitated the negotiations, resulting in agreements that included the repeal of Decree 883 and the creation of a commission to draft a new decree that better reflected the needs of the population (Diario el Comercio, 2019).

At the end of 2019, the economic crisis, aggravated by the COVID-19 pandemic, created a complicated situation that culminated in the collapse of the healthcare system and mass layoffs, further worsening the country's situation. Furthermore, in 2020, an increase in the homicide rate and the strengthening of organized crime in rural areas began to be noticed. The impacts of the pandemic exacerbated the country's crisis. "Poverty at the national level stood at 32.2% and extreme poverty at 14.7%" (National Institute of Statistics and Census - INEC, 2021).

The steadily increasing homicide rate since 2020 reached 608, while in 2021 it reached 1,039; in 2022 it reached 2,128, and in 2023 it reached a record 8,004 homicides (Ecuadorian Observatory of Organized Crime, 2023). This progressive increase underscored the need to implement effective measures to address violence and improve public safety, a challenge that remains complex to date.

In 2021, President Guillermo Lasso maintained his governance amid constant paralysis; due to rising fuel prices, the failure to reach agreements with political blocs, and the lack of majority support in the National Assembly; and because the instability of his position and constant protests led to a failed impeachment trial for an alleged crime against public administration.

By 2022, nationwide protests by Indigenous groups paralyzed the entire country for 17 days. These protesters caused losses and damages of USD 281.6 million in the public sector and USD 833.8 million in the private sector (Villareal, 2022). The possibility of establishing dialogue between the government and the Indigenous population forced them to opt for mediation. Some agreements were reached; however, they were not sufficient to overcome the existing political crisis.

Due to political instability, on May 17, 2023, President Lasso decided to issue the "crusade death" decree for the first time due to the serious political crisis, which entailed the cessation of his functions and the dissolution of the National Assembly and the call for early elections, in accordance with the provisions of Article 148 of the 2008 Constitution of the Republic of Ecuador. In the same year, the country faced a short electoral campaign and a disturbance occurred in society: the murder of former candidate Fernando Villavicencio in August and which, apparently, the investigations involved high-ranking officials involved in narcopolitics.

The August 20, 2023, elections led to a runoff. Daniel Noboa and Luisa González faced off on October 15, with the presidential candidate winning, Daniel Noboa, who would finish Guillermo Lasso's remaining term. So far, the president has made progress implementing the security policies established with the "Phoenix Plan." The performance of economic variables and corruption scandals will be key to his administration. In addition, he will have to address the results of the metastasis, purge, and plague cases, among others, that are becoming evident as the days go by.

In 2024, the Daniel Noboa administration committed to comprehensively addressing the security issue in Ecuador, recognizing the importance of this issue to the well-being and peace of the population. Therefore, it is establishing various policies and actions aimed at strengthening the national security system.

One of the most notable measures was the decision to eliminate the drug consumption schedule, a policy that seeks to more effectively address the problem of drug use and micro-trafficking. To implement these measures, the government declared a state of emergency in the country's prison system and, with the support of the armed forces, intervened in all prisons to improve prison conditions and reduce the incidence of criminal activity within them.

Regarding the fight against drug trafficking, drug seizure operations were intensified, breaking a historic record. At the same time, a popular consultation and referendum were held with eleven questions, nine of which were approved by the population. These questions were aimed at improving the country's security and combating drug trafficking and crime, reflecting Ecuadorian society's commitment to strengthening institutions and promoting citizen security.

However, despite these efforts to improve internal security, Ecuador is currently embroiled in a major diplomatic conflict with Mexico. This conflict stems from Ecuador's invasion of the Mexican

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

embassy, which has triggered tensions between the two countries and posed additional challenges in international relations.

1.2. Mediation in the judiciary

Every social interaction brings with it tensions that can lead to conflicts as opportunities for consensus and peace (Jordán Buenaño and Mayorga, 2019). In this context, mediation emerges as a versatile and appropriate solution for addressing conflicts in all areas, facilitating reconciliation, the restoration of relationships, and the creation of lasting agreements (Jordán-Buenaño et al., 2021).

The historical development of mediation in Ecuador dates back to the initial recognition of alternative dispute resolution methods in the 1929 Constitution, which first mentioned arbitration and conciliation tribunals. This recognition was maintained throughout several subsequent constitutions, including those of 1945, 1946, 1967, 1978, and 1979, thus establishing a significant legal basis. Mediation was formally recognized in the 1998 Political Constitution, which was reaffirmed by the 2008 Constitution of the Republic. This latter document establishes the State's responsibility to promote a culture of peace through alternative dispute resolution methods.

With the enactment of the Arbitration and Mediation Law in 1997 and later in 2006, recognition within the State was consolidated; however, the lack of dissemination of information on its application limited its effective use in the justice system. Over time, mediation has gained ground in the public sphere, especially in the judiciary since 2014, when it was introduced as a support for justice with the support of the Judicial Council, which launched a national program on mediation, justice, and a culture of peace in 2013. This initiative included training for judges, training for mediators, and promotional campaigns in all judicial units on mediation as a peaceful alternative for conflict resolution (Jordán Buenaño and Mayorga, 2019).

1.3. Mediation in the other powers of the Ecuadorian State.

Mediation as a conflict resolution tool in the judiciary has gradually gained traction (Vayas et al., 2022) since its connection with the judiciary in 2013; however, in the legislative, executive, electoral, and transparency and social control branches, analysis of the connection has been negligible and reluctant.

In the executive branch, the primary responsibility lies with the effective management of the state; however, a thorough analysis reveals a significant lack of participation in conflict management and the implementation of inclusive policies with civil society since the 1980s. Although there were brief periods of dialogue and mediation in 1992, 2019, and 2022, agreements were reached that somewhat calmed and curbed the protests.

The legislative branch, represented by the National Assembly, has undergone a series of political changes that have triggered several crises between the different parties, which are aligned with the interests of the political parties. These conflicts are often widely covered by the media, where

partisan disputes and power struggles have hindered legislative processes, which could have contributed to improving the country's situation in the face of the social challenges it has faced. Currently, corruption and the crisis of confidence in the Assembly are multiple and varied, with the lack of ethics within the legislative branch being one of the main problems (Chávez, 2006).

It cannot be said that mediation has played a role in resolving disputes between political parties or in conflicts of interest between the various branches of government. However, it has facilitated the negotiation of agreements benefiting certain political groups. It is important to highlight that mediation could be integrated into this branch as a valuable tool to strengthen its functioning by fostering collaboration, consensus-building, and the resolution of both internal and external conflicts, which would contribute to more efficient, equitable, and participatory decision-making.

Finally, mediation in electoral and citizen participation bodies can play a crucial role in resolving conflicts and promoting a fair and transparent electoral process. In the electoral field, mediation can intervene in disputes related to the organization of elections, the interpretation of electoral regulations, and the resolution of conflicts between different political actors. This includes managing disputes over candidate registration, the distribution of resources during the electoral campaign, and resolving complaints about irregularities during the electoral process.

Mediation can be instrumental in promoting citizen participation in the electoral process. It can facilitate dialogue between electoral bodies and civil society, promoting the inclusion of diverse voices and perspectives in the design and implementation of electoral policies. Mediation can also help resolve conflicts between citizen groups, ensuring that all voices are heard and that community interests are taken into account in the electoral process.

Therefore, the main objective of this paper was to analyze the implementation and evolution of mediation as a key tool for conflict resolution in Ecuador. The aim was to evaluate the effectiveness of mediation in strengthening social cohesion, its impact on reducing the judicial system's burden, and its relevance in forging agreements and consensus among the parties involved. Furthermore, the aim was to study the role of mediation in the different branches of government by analyzing its limitations and potential in the executive, legislative, electoral, and transparency and social oversight spheres, with the goal of proposing improvements that contribute to a more just and peaceful environment.

Methodology

To meet the objectives set, a methodology based on systematic review with both quantitative and qualitative approaches was applied.

First, statistical information was collected on mediation cases in the public sector in Ecuador from 2014 to 2023. These statistics were extracted from official sources, such as the National Mediation Center of the Judicial Branch and other accountability reports from institutions such as the Public Defender's Office and the Attorney General's Office. Through a comparative analysis, the evolution of cases handled, hearings held, and agreements reached were assessed.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

In addition, data on the creation and expansion of mediation centers in the country were reviewed. In parallel, a documentary review of previous studies on mediation in the Ecuadorian context was conducted, as well as an analysis of public policies related to mediation. This methodological approach allowed for a comprehensive understanding of the current situation of mediation in Ecuador.

Results

Below are the statistics related to mediation in the public sector of the Andean country (*Table 1*)..

Table 1

Statistics on Mediation in the Public Sector in Ecuador.

Year	Direct Request	Derivation	Transit Referral	Cases Attended	Audiences Installed	Agreements Reached
2014	25,449	10,108	No data	35,557	No data	13,801
2015	24,395	18,253	884	43,432	No data	28,836
2016	46,427	19,725	3,124	69,276	No data	34,781
2017	43,575	10,308	3,190	57,155	34,316	30,863
2018	39,771	9,840	2,724	52,335	31,577	28,475
2019	42,676	2,602	9,276	54,554	34,308	31,301
2020	19,677	4,779	880	25,336	14,607	13,461
2021	33,203	8,144	1,333	42,680	No data	No data
2022	40, 920	9,205	1,093	51,218	No data	No data
2023	44,044	8,853	871	53,768	No data	No data

Nota: National Center for Mediation of the Judicial Function (2024).

As can be seen, direct requests represented the number of cases that came directly to the mediation service without being referred from another source. Referrals indicated the number of cases that were referred from other institutions or by the judicial system itself; transit referrals show the number of cases referred from the transit system; cases attended to are those that went to mediation; and finally, data on the hearings held and the agreements reached in mediation are provided.

A gradual increase in the number of cases handled was observed over the years, peaking in 2019, which could indicate that mediation is an effective method for resolving conflicts in the public sector. An increase in direct requests and referrals was also evident, which could indicate greater awareness of the use of mediation services. The agreements reached appeared to fluctuate over the years, with peaks and valleys occurring at different times.

Regarding the reduction of the judicial system's caseload, it is notable that mediation has helped reduce the number of cases reaching the courts. If the agreements reached from 2014 to 2023 are added together, the justice system has saved 181,518 cases, which can be demonstrated as a relief to the judicial system's caseload.

Through better dissemination of mediation, the service and, consequently, the culture of peace could be further expanded, as conflicts are linked to the provision of public services, contributing to improving their quality and effectiveness. Rapid and effective dispute resolution can ensure better access to and delivery of services for the population.

Finally, it is important to note in this table the existence of years where data were not provided, especially regarding hearings held and agreements reached, which makes a complete assessment of the service's effectiveness in those years difficult. Regarding the creation of mediation centers, there has been constant growth in recent years. According to data collected by the Judicial Council, the entity responsible for approving these centers, 84 mediation centers were established in April 2019 (Jordán Buenaño and Mayorga, 2019). By the cutoff date of November 22, 2023, this figure had increased to 104 mediation centers, and a more recent review, with a cutoff date of February 19, 2024, found a total of 191 centers created (Judicial Council, April 11, 2024). This trend suggested a growing interest in mediation as a method of conflict resolution on the part of both public and private entities.

On the other hand, the Public Defender's Office, the autonomous body of the Judiciary that guarantees full and equal access to justice for defenseless individuals, has its own mediation center where proceedings have been conducted to support the judicial system. *Table 2* reviews the results from 2016 onward.

Table 2

Cases Managed Mediation Center at the Public Defender's Office – Ecuador.

Year	Managed Cases
2016	2436
2017	1407
2018	3071
2019	4990
2020	2492
2021	2871
2022	2942

Fuente: Accountability of the Public Defender's Office. Years 2016-2022 (Public Defender's Office of Ecuador, 2023)

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

This analysis showed the number of cases handled over a seven-year period, from 2016 to 2022. It was observed that there was a progressive increase in the number of cases handled until 2019. However, in the following years, a decrease in the number of cases handled was observed, with a slight drop in 2020, followed by a more significant decrease in 2021 and 2022. This decrease could be attributed to external circumstances such as the COVID-19 pandemic.

Table 3

Cases Managed Mediation Center at the State Attorney General's Office.

Year	Managed Cases
2016	1012
2017	2060
2018	2472
2019	2962
2020	2570
2021	2403
2022	1033

Fuente: Accountability of the State Attorney General's Office for the years 2016-2022 (State Attorney General's Office, 2023)

Similarly, the State Attorney General's Office Mediation Center provides services to the community. The number of cases handled through mediation fluctuated between 2016 and 2022. There was steady growth until 2019, followed by a decline and stabilization in the following years.

Conclusions

Ecuador has faced persistent challenges related to political polarization and a lack of empathy and conflict management among political leaders. A significant gap between the aspirations of the population and the actions taken by governments has clearly underscored the need for greater empathy, communication, and focus on the needs and demands of society, while also demonstrating a significant impact on the well-being of the Ecuadorian population.

Mediation has emerged as a highly effective method for resolving conflicts in Ecuador, demonstrating its ability to reduce government expenditures on the traditional judicial system and provide a faster and less expensive alternative for users immersed in legal disputes. The agreements reached through mediation have generated significant savings in resources and time, making a positive contribution to promoting a culture of peace and collaboration in society. Therefore, it is urgently necessary to implement mediation in public institutions as part of a state policy to strengthen social cohesion and promote peaceful justice.

The use of mediation in the judiciary represents a step forward in integration as a support for justice. Mediation programs have, over time, fostered a growing number of public and private mediation centers, reflecting positive long-term results in their development. However, work

remains to be done to ensure effective dissemination and more widespread use of this tool in the judicial system.

In relation to the executive, legislative, electoral, and transparency and social oversight branches, a lack of integration of mediation can be identified. Although it has been used at specific times to resolve political conflicts, its permanent incorporation in these areas could contribute to more equitable and participatory decision-making among those involved.

Finally, statistical data on mediation presented by the Judicial Council, the Public Defender's Office, and the Attorney General's Office have shown a gradual increase in the number of cases handled through mediation in the public sector, suggesting its effectiveness as a method of conflict resolution. Finally, the importance of greater transparency in data reporting was highlighted for a more complete assessment of mediation's effectiveness in future similar studies.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

References

Banco Central del Ecuador (1999-2000). *Las remesas de ecuatorianos en el exterior*. BCE. https://contenido.bce.fin.ec/documentos/PublicacionesNotas/Catalogo/Cuadernos/Cuad130.pdf

Banco Central del Ecuador (2001). *La dolarización en el Ecuador.* BCE. https://contenido.bce.fin.ec/documentos/PublicacionesNotas/Notas/Dolarizacion/pdf/Cabezas%20et%20al.pdf

Bush, R., y Folger, J. (1994). *The Promise of Mediation: The Transformative Approach to Conflict*. John Wiley & Sons.

Chávez, E. (2006). Ética en el Poder Legislativo. *Boletín mexicano de derecho comparado, 39*(115), 93-124. https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0041-86332006000100003

Consejo de la Judicatura (2022). *Rendición de cuentas*. Gobierno del Ecuador. https://www.funcionjudicial.gob.ec/rendicion-de-cuentas-2022-la-funcion-judicial-atraviesa-por-una-severa-crisis-por-la-falta-de-presupuesto/

Consejo de la Judicatura (2024). *Centros de mediación aprobados por el pleno del Consejo de la Judicatura corte al 22 de noviembre 2023*. Gobierno del Ecuador.

Decreto 833 de 2019. Por le que se viabiliza el alza de los precios de las gasolinas extra, ecopaís y diésel. 2 de octubre de 2019.

Defensoría Pública del Ecuador (2023). *Rendición de cuentas (2016-2022)*. Gobierno del Ecuador. https://www.defensoria.gob.ec/?page_id=32327

Herrera, G. (2022). *Migración y política migratoria en el Ecuador en el período 2000-2021*. Programa de las Naciones Unidas para el Desarrollo. https://www.undp.org/sites/g/files/zskgke326/files/2022-10/PNUDLAC-working-paper-33-Ecuador-ES.pdf

Huamani, O. y Macassi, L. (2022). Políticas Públicas para la gestión de conflictos: entre la institucionalización y el estancamiento. *IUS ET VERITAS*, (65), 70-82. https://doi.org/10.18800/iusetveritas.202202.005

Hung-Hui, J. (2008). América Latina: la corrupción y la pobreza. *Revista del CESLA*, (11), 105-118. https://www.redalyc.org/pdf/2433/243316550009.pdf

Jordán Buenaño, J., Jiménez, Á., y López, M. (2021). Violencia y mediación escolar en adolescentes ecuatorianos. *Revista Dilemas Contemporáneos: Educación, Política y Valores, 8*(3), 1-20. https://doi.org/10.46377/dilemas.v8i3.2656

Jordán Buenaño, J. y Mayorga, N. (2019). *La mediación una forma diferente de pensar en la justicia.* Editorial Pío XII.

Kriesberg, L. (1973). *The Sociology of Social Conflicts.* Prentice-Hall.

Ley Orgánica de Solidaridad y Corresponsabilidad Ciudadana para la Reconstrucción y Reactivación de las Zonas Afectadas por el Terremoto. 18 de mayo de 2016. Registro Oficial Suplemento 759.

Ministerio de Salud Pública y Organización Panamericana de la Salud (2000). *Crónicas de Desastres: El Fenómeno El Niño en Ecuador*. Organización Panamericana de la Salud. https://infoinundaciones.com/recursos/download/8046

Observatorio Ecuatoriano de Crimen Organizado (2023). *Boletín semestral de homicidios intencionales en el Ecuador: Análisis de la variación en el primer semestre en 2023.* OECO. https://oeco.padf.org/wp-content/uploads/2023/09/BOLETIN-SEMESTRAL-DE-HOMICIDIOS.pdf

Ortiz, A. (3 de febrero de 2015). Borja y la utopía de democratizar la izquierda. *Plan V.* https://www.planv.com.ec/ideas/ideas/borja-y-la-utopia-democratizar-la-izquierda

Procuraduría General del Estado (2023). *Rendición de Cuentas de la Procuraduría*

General del Estado (2016-2022). Gobierno del Ecuador. http://www.pge.gob.ec/index.php/component/sppagebuilder/page/161

Roth, A. (2019). Las políticas y la gestión públicas: un análisis desde la teoría y la práctica. *Estudios de la Gestión: Revista Internacional de Administración*, (5), 223-229. https://revistas.uasb.edu.ec/index.php/eg/article/download/1207/1125

Sánchez, J. (1996). *Las cifras del conflicto social en el Ecuador: 1980-1995*. Quito – Centro Andino de acción Popular. https://biblio.flacsoandes.edu.ec/libros/digital/47683.pdf

Unda, M. (2020). La crisis de la democracia entre el "retorno" y los desbordes

Populares. En Instituto de la Democracia, *Antología de la democracia ecuatoriana: 1979- 2020* (pp. 233-248). Instituto de la Democracia. https://institutodemocracia.gob.ec/wp-content/uploads/2020/05/libro_Antologia.pdf

Vayas, G.., Jordán, J., Vayas, C., y Tamayo, F. M. (2022). La eficacia de la mediación pública en el Ecuador, de la normativa a la realidad ecuatoriana. *Revista Polo del Conocimiento*, *7*(12), 941-963. https://polodelconocimiento.com/ojs/index.php/es/article/view/5038

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1438 • e-ISSN: 2631 - 2786

ICT-mediated Pedagogical Model Integrating ADDIE and Gamification: A Proposal to Improve Educational Research

Modelo pedagógico mediado por TIC integrando ADDIE y gamificación: Una propuesta para mejorar la investigación educativa

Date of receipt: 2024-08-23 • Date of acceptance: 2024-09-24 • Date of publication: 2025-01-10

María Del Cisne Loján Carrión [1]
Universidad Estatal Amazónica, Ecuador
mlojan@uea.edu.ec

María José Zambrano Solís [2]
Universidad Estatal Amazónica, Ecuador
mj.zambranos@uea.edu.ec
https://orcid.org/0009-0004-8609-1405

Olga Libia Torres Torres [3]
Universidad Estatal Amazónica, Ecuador
ol.torrest@uea.edu.ec

Alba Paola Chávez Colcha [4]
Ministerio de Educación, Ecuador
alba.chavez@educacion.gob.ec
https://orcid.org/0009-0001-3943-6982

Nelson Javier Villarreal Morales [5]
nvillarrealm@unemi.edu.ec
https://orcid.org/0009-0006-7017-2467

Abstract

This article presents a pedagogical model mediated by Information and Communication Technologies (ICT), which integrates the ADDIE model and gamification to optimize educational research. The design is conceptualized using the metaphor of an airplane, where each part represents a crucial component of the teaching-learning process: the fuselage symbolizes the central structure of instructional design; the wings represent the didactic and gamification strategies that drive learning; engines are associated with the technological tools that provide the necessary boost; the cockpit embodies teaching management and coordination; and the body of the plane contains the educational activities carried out by the students. The methodology is structured in five key phases of the ADDIE model applied in a virtual learning environment. The results indicate that the combination of ADDIE and gamification, supported by ICT, significantly improves student motivation, engagement, and academic performance. In addition, this approach facilitates the personalization of learning and continuous progress monitoring. The conclusions highlight the effectiveness of the proposed model in modernizing education, offering an adaptable structure that responds to the demands of an increasingly digitized and demanding academic and professional environment.

Keywords: ADDIE, gamification, ICT, Education

Resumen

Este artículo propuso un modelo pedagógico mediado por Tecnologías de la Información y la Comunicación (TIC) que integra el modelo ADDIE y la gamificación para optimizar la investigación educativa. La estructura del modelo se conceptualizó utilizando la metáfora de un avión, donde cada parte representa un componente esencial del proceso de enseñanza-aprendizaje: el fuselaje simboliza la estructura central del diseño instruccional; las alas representan las estrategias didácticas y de gamificación que potencian el aprendizaje; los motores se asocian con las herramientas tecnológicas que proporcionan el impulso necesario; la cabina del piloto encarna la gestión y coordinación docente; y el cuerpo del avión contiene las actividades educativas realizadas por los estudiantes. La metodología se estructuró en cinco fases clave del modelo ADDIE aplicadas en un entorno de aprendizaje virtual. Los resultados indicaron que la combinación de ADDIE y gamificación, apoyada por TIC, mejoró significativamente la motivación, el compromiso y el rendimiento académico de los estudiantes. Además, este enfoque facilitó la personalización del aprendizaje y la supervisión continua del progreso. Las conclusiones destacaron la efectividad del modelo propuesto para modernizar la educación, ofreciendo una estructura adaptable que responde a las demandas de un entorno académico y profesional cada vez más digitalizado.

Palabras clave: ADDIE, gamificación, TIC, Educación

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

The integration of Information and Communication Technologies (ICT) into education has radically transformed conventional pedagogical practices, enabling the adoption of teaching and learning methods that foster interactivity, personalization, and inclusion (Sangrà et al., 2012). In this context, educational research faced the challenge of adapting these technological advances to optimize teaching and learning processes. The ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) has established itself as a systematic approach to instructional design, offering an organized structure that facilitates the creation of effective educational experiences (Molenda, 2015). However, despite its effectiveness, the ADDIE model can be enriched by integrating innovative methodologies that respond to the demands of 21st-century students.

One of these methodologies is gamification, which incorporates game elements into non-game contexts to increase student motivation and engagement (Deterding et al., 2011). Recent research has shown that gamification not only improves motivation but can also have a positive impact on academic performance and learning retention (Buckley and Doyle, 2014). Virtual Learning Environments (VLEs) such as Moodle and Sakai have established themselves as fundamental platforms for the implementation of innovative pedagogical strategies, allowing the adaptation of educational content to the individual needs of students (García and Tejedor, 2016). These platforms not only facilitate access to educational resources but also allow for the application of continuous and personalized assessments essential for inclusive and effective learning (Valverde et al., 2020). This study proposed a pedagogical model that combines the ADDIE approach with gamification, mediated by ICT, to enhance educational research. It also explored how Virtual Learning Environments can be used to promote inclusive learning and how ICT can transform assessment processes and the implementation of pedagogical strategies in secondary education. Finally, it considered neuroeducation as a comprehensive approach to designing learning experiences that consider cognition and brain function (Tokuhama-Espinosa, 2014).

1.1. ADDIE Model in Education

The ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model is widely recognized for its flexibility and effectiveness in instructional design in diverse educational contexts, ranging from formal education to corporate training and distance education (Branch and Dousay, 2015). This approach is based on a sequential structure that allows educators to create educational programs tailored to specific student needs and pedagogical objectives (Morrison et al., 2011). A notable aspect of the ADDIE model is its ability to integrate diverse learning theories and pedagogical approaches. For example, it has been effectively used in constructivist contexts, where active learning and student construction of knowledge are emphasized (Molenda, 2015). This model is especially relevant in digital educational environments, where students can interact with multimedia content, participate in online discussions, and collaborate on group projects, all facilitated by rigorous instructional design. The Assessment phase of the ADDIE model focuses not only on measuring student performance but also on continuously evaluating

and improving the teaching process itself. This aspect is crucial to ensuring that educational programs remain relevant and effective in changing contexts (Reigeluth, 1999). The integration of emerging technologies such as Information and Communication Management Technologies (ICM) has expanded the capabilities of the ADDIE model, providing advanced tools for learning personalization and real-time monitoring of student progress (García and Tejedor, 2016).

1.2. Gamification in Education

Gamification has established itself as a powerful methodology for engaging students in the learning process by including game elements in educational environments (Deterding et al., 2011). This technique has been shown to be especially effective in increasing both intrinsic and extrinsic student motivation, improving their academic performance and satisfaction with learning (Buckley and Doyle, 2014). Self-determination theory, proposed by Ryan and Deci (2000), supports the idea that students' intrinsic motivation is strengthened when they experience competence, autonomy, and social connection. Gamification, by offering challenges tailored to students' skill level, personalized options, and an environment that fosters collaboration and friendly competition, fits perfectly with these principles (Kapp, 2012).

Gamification has established itself as a powerful methodology for engaging students in the learning process by including game elements in educational environments (Deterding et al., 2011). This technique has been shown to be especially effective in increasing both intrinsic and extrinsic student motivation, improving their academic performance and satisfaction with learning (Buckley and Doyle, 2014). Self-determination theory, proposed by Ryan and Deci (2000), supports the idea that students' intrinsic motivation is strengthened when they experience competence, autonomy, and social connection. Gamification, by offering challenges tailored to students' skill level, personalized options, and an environment that fosters collaboration and friendly competition, fits perfectly with these principles (Kapp, 2012).

1.3. Virtual Learning Environments (EVA & AVA)

Virtual Learning Platforms (VLPs), such as Moodle, Blackboard, and Sakai, have transformed education by offering environments that facilitate flexible, personalized, and adaptive learning (Bower et al., 2015). These tools allow educators to design educational experiences that fit students' needs and learning styles, promoting inclusion and improving accessibility (Sangrà et al., 2012). The incorporation of Information and Communication Technologies (ICTs) into VLPs has strengthened these platforms, facilitating advanced management of educational information and effective communication between participants in the educational process (Valverde et al., 2020). In these environments, ICTs not only simplify content delivery but also enable learning personalization, adjusting educational paths to individual students' needs and providing immediate feedback (Bower et al., 2015). Furthermore, TGISC-supported AVPs enable continuous and personalized assessment, which is essential for adaptive learning and improved academic performance (García & Tejedor, 2016). These environments' ability to collect and analyze real-time data on student performance has opened up new possibilities for evidence-based education, where pedagogical decisions are based on detailed and accurate analyses (Siemens, 2013).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

1.4. 1.4.Neuroeducation and Methodological Design

Neuroeducation, which combines cognitive neuroscience with education, offers valuable insights into how the brain functions during learning and how to design more effective, student-centered educational experiences (Tokuhama, 2014). This field emphasizes the importance of aligning pedagogical strategies with natural brain processes such as attention, memory, and motivation to optimize learning (Sousa, 2017). Neuroeducation highlights that learning is a highly individualized process, influenced by cognitive and emotional differences among students. Information and Communication Technologies (ICTs), by enabling the collection of data on students' cognitive and emotional responses, facilitate the personalization of learning and the adaptation of pedagogical strategies to maximize their effectiveness (Tokuhama, 2014).

Furthermore, neuroeducational research has shown that emotions play a crucial role in the learning process. Experiences that generate positive emotions, such as curiosity and joy, can significantly improve information retention and knowledge transfer (Immordino and Damasio, 2007). Gamification, which emotionally engages students through challenges and rewards, aligns with these neuroeducational principles, creating learning environments that are both cognitively stimulating and emotionally enriching (Kapp, 2012).

1.5. Innovative Techno-Pedagogical Structure Focused on ICMTs.

Information and Communication Management Technologies (ICMTs) represent an advanced approach to digital education, combining data management, effective communication, and real-time analytics to optimize teaching and learning processes (García and Tejedor, 2016). These technologies enable the creation of dynamic and adaptive learning environments that adapt to students' changing needs, facilitating deep learning personalization and efficient management of educational resources (Siemens, 2013). Within an innovative techno-pedagogical structure, ICMTs integrate multiple functions, from the organization and distribution of educational content to the monitoring and analysis of student progress. This integration not only improves the efficiency of the educational process but also enables more effective and timely feedback, real-time problem identification, and the implementation of personalized educational interventions (Valverde et al., 2020). In the context of gamification, SGITs facilitate the personalization of learning experiences, adapting educational challenges to students' individual abilities and needs. This data-driven approach ensures that the learning experience is not only motivating but also aligned with specific educational objectives, optimizing the pedagogical impact (Kapp, 2012). In short, SGITs are fundamental to creating educational environments that are efficient, inclusive, and student-centered, promoting adaptive and evidence-based learning (Siemens, 2013).

Methodology

The methodology presented was based on a solid theoretical framework derived from the integration of key bibliographic references in the fields of pedagogy, ICT, and gamification,

combined under the ADDIE model. This methodological approach acted as the "learning vehicle" that guided the design and implementation of the educational proposal. The methodology is described below, structured in five main phases according to the ADDIE model, each enriched with evidence from the academic literature.

Analysis Phase (A)

The analysis phase focused on identifying educational and technological needs based on a thorough literature review. According to Gagné et al. (1992), needs analysis is essential to the success of any instructional design. This phase includes:

- Literature review: Relevant studies addressing the integration of ICT in education (Molenda, 2015), the effectiveness of gamification in educational environments (Kapp, 2012) and the application of the ADDIE model in various contexts (Branch and Dousay, 2015) were examined.
- Definition of objectives: Based on the review of previous studies, clear learning objectives are established, aligned with the competencies necessary for educational research, as suggested by Morrison et al. (2011).
- Identifying challenges: Reviewing works such as those by Hamari et al. (2014) allows us to anticipate common challenges in the implementation of ICT and gamification, such as resistance to change and lack of adequate infrastructure.

Design Phase (D)

In this phase, a detailed instructional plan was developed, guided by theory and best practices identified in the literature. According to Merrill (2002), effective design should be based on sound instructional principles that facilitate deep learning.

- Content structuring: Educational content is organized into sequential modules, integrating recommendations from studies on the effectiveness of modular instruction and interactive multimedia (Reigeluth, 1999).
- Gamification strategies: Gamification strategies are designed based on work such as that of Deterding et al. (2011), which highlights the importance of narrative, progression, and feedback to increase student motivation.
- Technological adaptation: Appropriate ICT tools, such as LMS platforms and gamification applications, are selected based on previous research on their effectiveness in educational environments (Bower et al., 2015).

Development Phase (D)

The development phase focused on the creation and adaptation of educational materials, guided by guidelines identified in the literature.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

- Production of materials: Digital educational resources (videos, simulators, interactive questionnaires) are developed using tools such as Adobe Captivate and Articulate Storyline, according to recommendations from instructional design experts (Morrison et al., 2011).
- Testing and validation: Pilot testing of the developed materials is proposed to ensure their quality and effectiveness, following the procedures described by Branch and Dousay (2015).

Implementation Phase (I)

The implementation of the pedagogical model was designed to take place in a virtual learning environment, supported by ICT.

- Program implementation: The steps for implementation on platforms such as Moodle are detailed, based on studies that demonstrate its effectiveness in distance education (García and Tejedor, 2016).
- Gamified activities: The proposed activities are designed based on the literature on effective gamification, ensuring that the game elements maintain motivation and engagement (Kapp, 2012).

Evaluation Phase (E)

Finally, the evaluation phase proposes a formative and summative approach, aligned with the principles described in the literature.

- Formative assessment: The implementation of continuous assessments is proposed to monitor progress, using techniques suggested by authors such as Gagné et al. (1992).
- Summative evaluation: The effectiveness of the model will be evaluated through final projects and exams, complemented by satisfaction surveys, as recommended by the literature on educational evaluation (Reigeluth, 1999).
- Analysis and feedback: A detailed analysis of the evaluation results will be carried out, supported by the literature to make adjustments and improvements to the proposed pedagogical model (Merrill, 2002).

Results

The proposal to use the structure of an airplane as a metaphor for the pedagogical components of MPmTIC (ICT-mediated pedagogical model) and gamification has been enriched with specific details about how each component of the airplane correlates with key aspects of the educational process. Detailed results are presented below in *Table 1*, including how the different parts of the airplane are integrated into the pedagogical model, supported by the ADDIE model.

Table 1

Relationship between the Parts of the Aircraft and Pedagogical Components of the MPmTIC Model.

Parts of the Airplane	Pedagogical Components	Description
Fuselage	Main Structure of Instructional Design	It represents the planning and organization of the content and learning objectives.
Wings	Teaching Strategies and Gamification	They symbolize strategies used to motivate and engage students, such as gamification.
Engines	Technological and Techno Pedagogical Tools	They promote the necessary drive for learning through LMS and gamification applications.
Cockpit	Teaching Management and Coordination	Space where the teacher monitors and directs the educational process.
Body of the Aircraft	Educational activities	Contains the individual and collaborative activities that students carry out.
Wheels	Technical and pedagogical support	They promote the infrastructure and support necessary for the digital learning environment

Nota. Detailed parts of the aircraft and its structure.

3.1. Fuselage: Main Structure of the Instructional Design

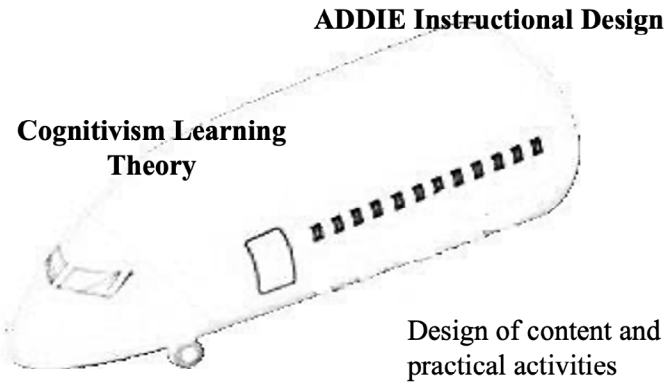
The airplane fuselage represented in *Figure 1* represents the central structure of the ICT-mediated pedagogical model (ICTmPM). This component was essential for the model's analysis and design, ensuring that the learning objectives were clearly defined and aligned with the identified needs of the students. The information gathered during the analysis phase allowed for the development of a content plan and effective pedagogical strategies.

- Analysis (A): Clear competencies and goals are defined, an initial diagnosis is made to identify students' needs and prior levels through surveys and data analysis, and appropriate ICT tools are selected, such as LMS platforms (Moodle or Canvas) and Google Forms surveys.
- Design (D): Content is planned through teaching modules, interactive teaching resources such as animated presentations and e-books are created, and gamification strategies are designed that include levels, badges, challenges, and rewards.
- Development (D): Educational materials (videos, podcasts, interactive simulators, and quizzes) are produced, and assistive technologies are implemented using authoring tools such as Adobe Captivate or Articulate Storyline. Gamification platforms such as Classcraft or Kahoot are also integrated..
- Implementation (I): Synchronous and asynchronous activities are carried out in the virtual environment, learning is facilitated through tutorials and discussion forums, and quizzes are used for formative assessment.
- Assessment (E): Summative assessments are conducted through exams and final projects, student performance and satisfaction are reviewed, and adjustments are implemented to improve the educational process.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 1

Fuselage Components: MPmTIC Design.



Note. The figure shows how the aircraft fuselage symbolizes the planning and organization of instructional design, integrating the phases of the ADDIE model.

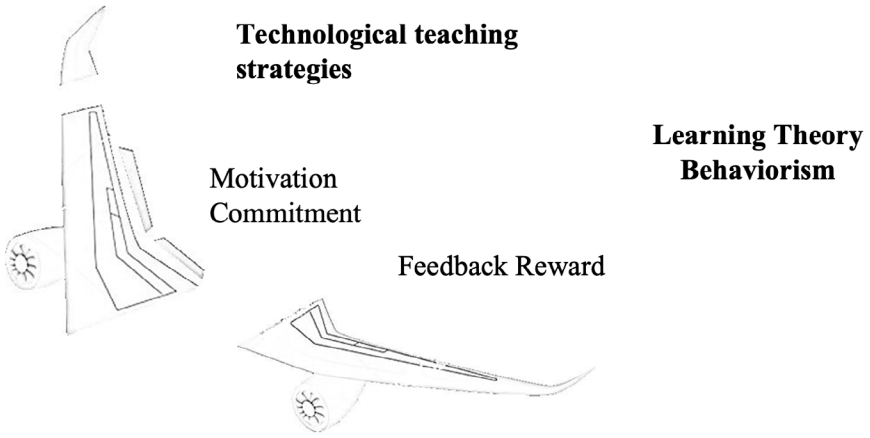
3.2. Wings of the Airplane: Teaching and Gamification Strategies

In *Figure 2*, the airplane's wings symbolized the teaching and gamification strategies that drive the educational model. These strategies allowed the model to "fly," keeping students motivated and engaged through well-designed activities..

- Motivation and Engagement: A narrative serves as a guiding thread for the activities, allowing for the creation and customization of avatars, and difficulty levels are set to maintain student interest.
- Feedback and Rewards: Point systems, digital badges, and achievements are implemented, and an honor roll is published to encourage competition and collaboration among students.
- Collaboration and Competition: Working groups are formed for collaborative projects, competitions based on educational content are organized, and the use of educational social networks like Edmodo is encouraged to share achievements and resources.

Figure 2

Interaction of Engines and Wings in the Educational Aircraft..



Nota. The figure highlights the interaction between teaching strategies (wings) and technological tools (engines), showing how they work together to drive learning.

3.3. Aircraft Engines: Technological Tools and Techno Pedagogy

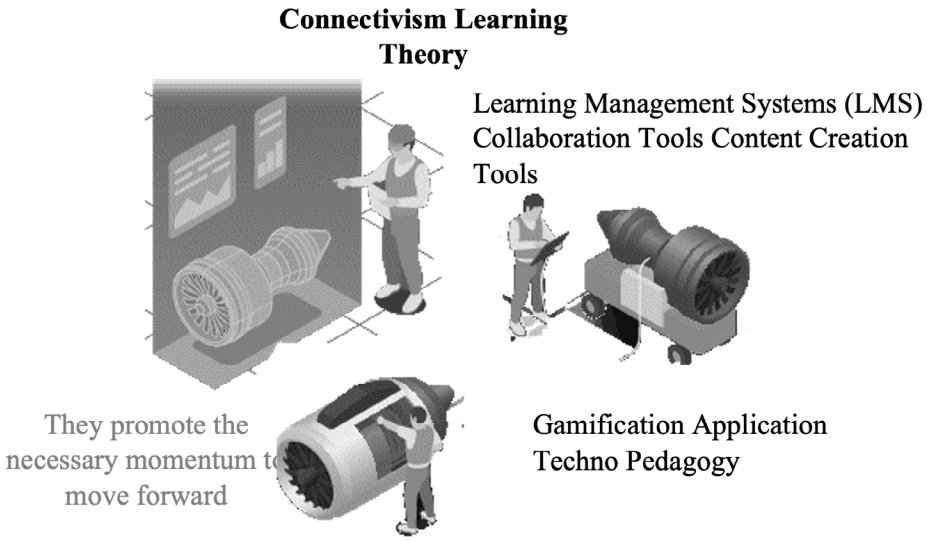
In *Figure 3*, the airplane's engines provide the necessary momentum for the pedagogical model to move forward. These engines correspond to the technological and techno-pedagogical tools that facilitate content management, collaboration, and motivation in the learning environment..

- Learning Management Systems (LMS): Tools such as Moodle, Canvas, and Blackboard manage and organize educational content.
- Collaboration tools: Google Workspace, Microsoft Teams, and Slack facilitate communication and collaboration between students and teachers.
- Content creation tools: Powtoon, Canva, and Prezi are used to develop engaging and interactive educational materials.
- Gamification apps: Classcraft, Kahoot, and Quizizz integrate game elements to increase student motivation and engagement.
- Techno Pedagogy: Content is adapted to personalize learning, ensuring that resources are accessible to all students, and learning analytics are implemented to continuously adjust and improve educational processes.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 3

Schematic of the MPmTIC Model based on the Aircraft Structure.



Nota. The figure illustrates how each part of the aircraft, including the engines, relates to a specific component of the pedagogical model.

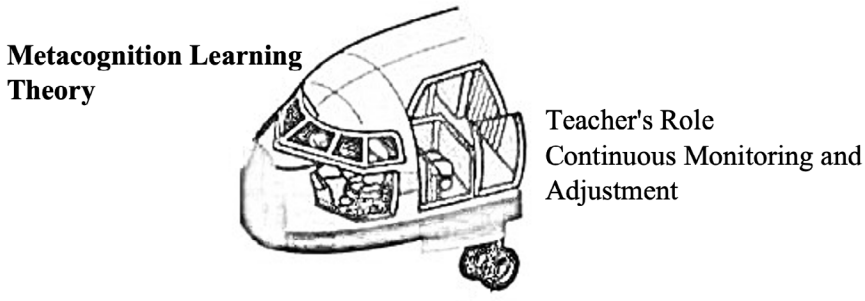
3.4. Cockpit: Teaching Management and Coordination

In *Figure 4*, the cockpit symbolizes the teacher's role in managing and coordinating the educational process. Here, the teacher acts as a facilitator, evaluator, and motivator, using analytical tools to monitor progress and make real-time adjustments.

- Role of the teacher: The teacher guides and supports students, evaluates their progress, and encourages their active participation.
- Continuous monitoring and adjustment: Analytical tools are used to monitor progress, and periodic meetings are held to adjust and improve the educational process.

Figure 4

Management and Coordination in the Cockpit.



Nota. The figure shows how the cockpit aligns with educational management, representing the space from which the teacher directs and supervises the teaching-learning process.

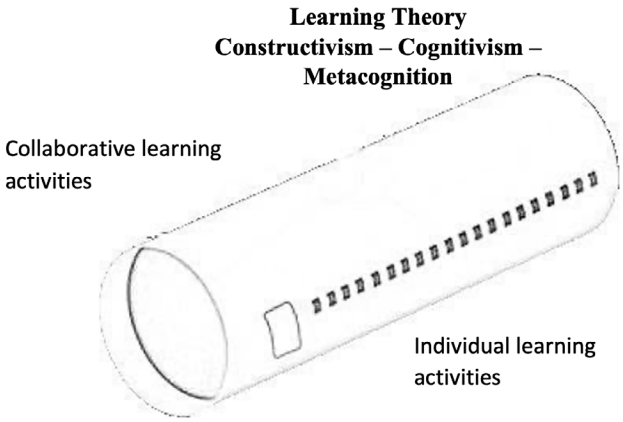
3.5. Aircraft Body: Educational Activities

In *Figure 5*, the body of the plane represents the educational activities the students carried out, both individually and collaboratively. These activities are essential for the practical application of knowledge and the development of skills.

- Actividades de aprendizaje individual: Incluyen lecturas interactivas, simulaciones, laboratorios virtuales, y autoevaluaciones con retroalimentación inmediata.
- Actividades de aprendizaje colaborativo: Se realizan proyectos grupales, foros de discusión, y juegos educativos, que permiten aplicar los conocimientos en un entorno lúdico y motivador.

Figure 5

Educational Activities in the Air Force Corps.



Nota. The figure shows how the body of the aircraft houses the essential educational activities for learning, integrating approaches such as constructivism and connectivism.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

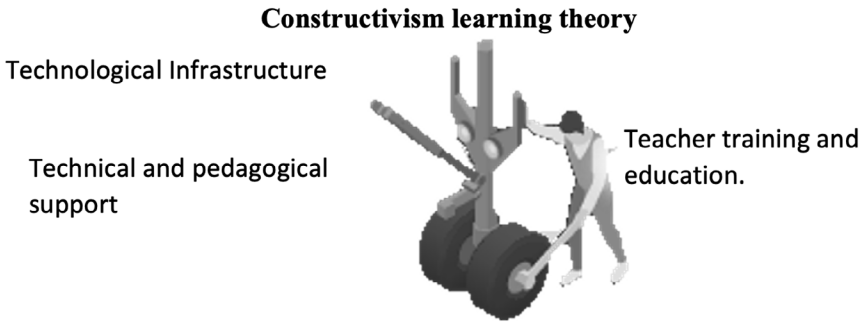
3.6. Airplane Wheels: Fundamental Supports

In *Figure 6* the airplane wheels were shown representing the fundamental supports of the pedagogical model, such as the technological infrastructure, the continuous training of teachers, and the technical and pedagogical support necessary for the effective functioning of the learning environment.

- Technological Infrastructure: Includes internet connectivity, devices, servers, and management software necessary to support the digital learning environment.
- Teacher Training and Education: Continuing education is essential for the effective implementation of the pedagogical model.
- Technical and Pedagogical Support: Provides ongoing assistance to teachers and students, optimizing the use of technology and resolving issues.

Figure 6

Fundamental Supports Represented by the Wheels of the Airplane.



Nota. The figure illustrates how the airplane's wheels represent the support elements that ensure a stable and accessible learning environment.

This MPmTIC pedagogical model, integrating ADDIE, gamification, Technopedagogy, and learning theories, provides a robust and dynamic structure to improve the teaching-learning process. Each part of the aircraft symbolizes different components and roles, ensuring interactive, collaborative, and personalized learning.

Conclusions

This article proposed an innovative pedagogical model mediated by Information and Communication Technologies (ICT), which integrates the ADDIE model and gamification as key strategies for improving educational research. Using a structural analogy with an airplane, several essential pedagogical components were identified and correlated, which can be optimized through this proposal. The main conclusions derived from this study were the following.

The use of an airplane structure as a pedagogical metaphor has proven effective in visualizing and organizing key components of the teaching-learning process. This metaphor facilitated the understanding and planning of the pedagogical model, making the integration of ICT and gamification more accessible in diverse educational contexts. Furthermore, the combination of the ADDIE model with gamification strategies has shown great potential for improving student motivation, engagement, and academic performance. By structuring the educational process into well-defined phases (Analysis, Design, Development, Implementation, and Evaluation) and adding playful elements, learning was more dynamic, engaging, and effective.

The implementation of ICT tools, such as learning management systems (LMS), gamification applications, and collaboration tools, is crucial to modernizing and optimizing the educational process. These technologies not only facilitate content management and distribution but also allow for personalized learning and real-time monitoring of student progress. Teachers play a fundamental role in the implementation of the pedagogical model, acting as facilitators, evaluators, and motivators. The use of analytical tools and the ability to adjust the educational process in real time are critical to ensuring that the model meets its objectives and adapts to students' needs.

Technological infrastructure, ongoing teacher training, and technical and pedagogical support are essential pillars for the sustainability and success of the proposed pedagogical model. Investment in these supports guarantees a robust, accessible, and efficient learning environment. This pedagogical model has the potential to significantly improve the quality and effectiveness of educational research. By providing a structured and dynamic approach, mediated by ICT and reinforced by gamification, students are expected to develop stronger research skills and be better prepared to face the challenges of the academic and professional world.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

References

Branch, R. y Dousay,T. (2015). *Survey of instructional development models.* Association for Educational Communication and Technology.

Bergmann, J. y Sams, A. (2012). *Flip your classroom: Reach every student in every class every day.* International Society for Technology in Education.

Bower, M., Dalgarno, B., Kennedy, G., Lee, M., y Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case análisis. *Computers & Education, 86*, 1-17. https://doi.org/10.1016/j.compedu.2015.03.006

Bukley, P. y Doyle, E. (2014). Gamification and student motivation. *Interactive Learning Environments*, *24*(6), 1162–1175. https://doi.org/10.1080/10494820.2014.964263

Coll, C. y Monereo, C. (2008). *Psicología de la educación virtual: Aprender y enseñar con las tecnologías de la información y la comunicación.* Morata.

Deterding, S., Dixon, D., Khaled, R., y Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". *Proceedings of the 15th International Academic Mindtrek Conference: Envisioning Future Media Environments* (pp.9-15). ACM

Dillenbourg, P. (1999). What do you mean by collaborative learning? En P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches* (pp. 1-19). Elsevier.

Gagne R., Briggs, L., y Wager, W. (1992). *Principles of instructional design* (4th ed.). Harcourt Brance Jovanovich College Publishers.

García, A. y Tejedor, F. (2016). La integración de Internet en la educación escolar: La realidad del profesorado. *Revista de Educación,* (362), 35-59.

Gómez, I. (2020). La gamificación como estrategia metodológica en Educación Primaria. *Revista Electrónica Educare*, *24*(1), 1-18. https://doi.org/10.15359/ree.24-1.1

Hamari, J., Koivisto, J., y Sarsa, H. (2014). Does gamification work? – A literature review of empirical studies on gamification. *Proceedings of the 47th Hawaii International Conference on System Sciences* (pp. 3025-3034). IEEE. https://doi.org/10.1109/HICSS.2014.377

Immordino, M. y Damasio, A. (2007). We Feel, Therefore We Learn: The Relevance of Affective and Social Neuroscience to Education. Mind, Brand and Education, 1(1), 3-10. https://doi.org/10.1111/j.1751-228X.2007.00004.x

Kapp, K. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. Pfeiffer.

Lee, J. y Hammer, J. (2011). Gamification in education: What, how, why bother? *Academic Exchange Quarterly, 15*(2), 1-5. https://dialnet.unirioja.es/servlet/articulo?codigo=3714308

Merrill, M. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43-59. https://doi.org/10.1007/BF02505024

Molenda, M. (2015). In search of the elusive ADDIE model. *Performance Improvement, 54*(2), 40-42. https://doi.org/10.1002/pfi.21461

Morales, C. (2018). El modelo ADDIE en la formación del profesorado universitario para la enseñanza con TIC. *Apertura, 14*(1), 23-39. https://doi.org/10.5944/ried.21.1.18559

Morrison, G., Ross, S., Kalman, H., y Kemp, J. (2011). *Designing effective instruction* (6th ed.). Wiley.

Reigeluth, C. (1999). *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 2). Lawrence Erlbaum Associates.

Sangrà, A., Vlachopoulos, D., y Cabrera, N. (2012). Building an inclusive definition of e-learning: An approach to the conceptual framework. *The International Review of Research in Open and Distributed Learning, 13*(2), 145-159. https://doi.org/10.19173/irrodl.v13i2.1161

Subhash, S. y Cudney, E. (2018). Gamified learning in higher education: A systematic review of the literatura. *Computers in Human Behavior, 87*, 192-206. https://doi.org/10.1016/j.chb.2018.05.028

Tokuhama, T. (2014). *Making Classrooms Better: 50 Practical Applications of Mind, Brain, and Education Science*. WW Norton and Company.

Valverde, J., Garrido, M., Burgos, C., y Morales, M. (2020). Trends in educational research about e-learning: A systematic literature review (2009–2018). *Sustainability, 12*(12). https://doi.org/10.3390/su12125153

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Uisrael
REVISTA CIENTÍFICA

January – April 2025 Period
Vol. 12, No. 1
rcientifica@uisrael.edu.ec
https://doi.org/10.35290/rcui.v12n1.2025.1483 • e-ISSN: 2631 - 2786

Didactic strategies to foster critical thinking in the development of communication competencies: A systematic literature review using the SALSA method

Estrategias didácticas para fomentar el pensamiento crítico en el desarrollo de competencias comunicacionales: Una revisión sistemática de literatura con el Método SALSA

Date of receipt: 2024-11-21 • Date of acceptance: 2024-11-21 • Date of publication: 2025-01-10

Sara Elena Marín Ube [1]
Universidad César Vallejo, Perú
saramarin15@hotmail.com
https://orcid.org/0000-0001-5063-6398

Jhair Vladimir Jiménez Aldaz [2]
Universidad de Guayaquil, Ecuador
Jhair.jimeneza@ug.edu.ec
https://orcid.org/0000-0002-9760-9108

Luis Enrique Cortez Alvarado [3]
Universidad de Guayaquil
luis.corteza@ug.edu.ec
https://orcid.org/0000-0002-7832-8140

Boris René Morales Fischer [4]
Universidad de Guayaquil, Ecuador
boris.moralesf@ug.edu.ec
https://orcid.org/0009-0004-8630-2620

Abstract

The evolution evidenced worldwide has generated a new way of acting on the part of human beings, to the point that all strategic sectors of society need to assimilate and implement new methodologies and strategies that allow them to optimally leverage resources and human talent. Education is a fundamental pillar that has benefited from these updates; a clear example is the application of didactic strategies to foster critical thinking and the development of communication skills.

The implementation of innovative strategies allows students to improve their reasoning, analysis, synthesis, and other skills that contribute to their academic, personal, and professional growth. Different social contexts require individuals to adequately articulate the various concepts and ideas that arise from the assimilation of information. In this sense, the present study conducts a systematic literature review on didactic strategies to promote critical thinking in the development of communication competencies; the SALSA method is used to develop the proposed work, which consists of four important stages to identify the current situation of the topic.

Keywords: education, didactic strategies, critical thinking, communication competencies

Resumen

La evolución que se evidencia a nivel mundial ha generado una nueva forma de actuar por parte del ser humano, a tal punto que todos los sectores estratégicos de la sociedad necesitan asimilar e insertar nuevas metodologías y estrategias que les permitan aprovechar de manera óptima los recursos y el talento humano. La educación es un pilar fundamental que se ha beneficiado con estas actualizaciones, muestra de ello es la aplicación de estrategias didácticas para fomentar el pensamiento crítico y el desarrollo de las competencias comunicacionales.

La implementación de novedosas estrategias permite a los estudiantes mejorar su razonamiento, análisis, síntesis y otras habilidades que les ayudan a su crecimiento académico, personal y profesional. Los distintos contextos sociales exigen que las personas necesiten exteriorizar de manera adecuada los distintos conceptos e ideas que surgen a partir de la asimilación de la información. En tal sentido, el presente estudio realizó una revisión sistemática de literatura sobre las estrategias didácticas para fomentar el pensamiento crítico en el desarrollo de competencias comunicacionales; se utilizó el método SALSA para desarrollar el trabajo propuesto, el mismo que constó de cuatro etapas importantes para identificar la situación actual del tema.

Palabras clave: educación, estrategias didácticas, pensamiento crítico, competencias comunicacionales

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Introduction

Education is a means to develop the capacities of every individual who is part of society. During the teaching-learning process, human beings receive and generate information that facilitates the construction of knowledge. The implementation of didactic strategies in academic training is important to foster critical thinking in students, whose academic path is oriented toward increasing their potential based on the way in which they resolve and respond to social problems. Chancusig and Granja (2023) pointed out that it is important to implement strategies in the classroom that stimulate critical thinking, since "it is essential to promote enriching learning and prepare students for the challenges of the contemporary world" (p. 33).

Academic training requires ongoing preparation and updating of knowledge. The more advanced the educational level, the more educational strategies must be implemented that are tailored to the needs and abilities of students. The cognitive evolution of human beings, developed in educational institutions, encourages information-based analysis, debate, problem-solving, and the externalization of critical thinking generated by the exchange of concepts.

The methodologies used in education have improved over the years. The application of innovative pedagogical strategies has helped foster critical thinking among students and developed communication skills that allow them to communicate concepts in a clear, reasonable, and understandable manner. Communication skills encompass verbal, nonverbal, and digital expressions, which are essential for improving the teaching-learning process, as they foster better and more effective interaction between teachers and students, which promotes participation, critical thinking, and reflection (González and Robalino, 2024).

The current generation's learning is based on new technologies and methodologies that seek to exploit each student's cognitive capacity. The better the content is assimilated, the better responses are developed. Professionals' use of teaching strategies and new information and communication technologies should be student-centered to stimulate an interactive learning environment (Morales, 2023). Students receive information, analyze, synthesize, and reasonably express new content. With a large amount of information available, educators apply teaching strategies to develop critical thinking in students. They are also responsible for fostering communication skills so that each individual is able to express their ideas, whether orally or in writing. It is important to consider that the reception and transmission of knowledge must be carried out in such a way that the information is easy to understand and transmit, and that those involved in the teaching-learning process use the same language and have prior knowledge that allows them to continue developing their critical thinking and improving their skills to perform adequately at an academic, personal, and professional level.

Modern education requires teachers to develop critical thinking skills that enable them to analyze situations and solve problems. The development of reasoning relies heavily on the didactic strategies applied during the teaching-learning process, in which educators, in addition to transmitting knowledge, instruct and guide students on how to express ideas and thoughts to generate debate, seek solutions, and convey new information in an understandable manner.

Teaching strategies foster critical thinking and contribute to communication skills when externalizing or sharing knowledge developed during the teaching-learning process. The importance and influence of this topic in the academic field and its social interest motivated the development of this work. Through a systematic literature review using the SALSA Method, the study of teaching strategies to foster critical thinking in the development of communication skills will be developed.

The proposed study was organized in such a way that the methodology to be used was defined in the following section and subsequently a literature review was developed, the most important aspects were discussed, and finally, the general conclusions based on the proposed work were presented.

Methodology

The present study was developed using the SALSA Frameworks; Noboa (2023) stated that this method "considers four components in a systematic review: search, evaluation, synthesis, and analysis" (p. 4412). The application of this methodology enriched and facilitated the development of the proposed work.

2.1. Search

The abundant information available on teaching strategies to foster critical thinking and communication skills prompted a search for studies indexed in recent years for review. This is because knowledge and research are updated over the years, and new information emerges, which is immediately available and contributes to a large database generated thanks to the digital age. The search for research papers of academic and scientific relevance benefited the support of this paper.

Currently, new technologies have facilitated the creation of multiple resources that house large databases, which are available to researchers to support the development of their respective studies. Physical and, primarily, digital resources contain important information; however, an organized search for up-to-date scientific content was required to support this study. Reliable bibliographic sources were found on sites such as SCOPUS, SciELO, ScienceDirect, and other digital platforms that contain abundant credible studies and contribute to the academic and scientific fields, which contributes to the development of this work.

2.2. Evaluation

The search for works that contributed to the research yielded a wealth of information. Therefore, the studies considered in the initial phase had to comply with inclusion and exclusion criteria to evaluate and select the content that most contributed to the development of the proposed work. For this reason, certain parameters were applied at this stage, such as the relevance, interest, and influence of the selected research. The evaluation of the works obtained from the search on the websites and platforms mentioned in the first component of the SALSA Frameworks was

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

fundamental, as it was necessary to assess which studies would be included in the research and which would be excluded. The quality and interest of the research are important requirements when considering which studies will contribute to an adequate synthesis and analysis.

The information obtained for this study was selected based on the contributions and results demonstrated in their respective research. Similarly, to provide up-to-date content, we chose to consider works from the last five years that delve into relevant data related to teaching strategies to foster critical thinking and the development of communication skills. The aforementioned platforms and websites were chosen because these digital resources have gained credibility and recognition in the research field. They also offer studies in different languages, which generate different perspectives and analyses. However, for the proposed work, studies with assimilable and understandable content were prioritized to avoid potential distortion of the message.

Because the teaching strategies influenced critical thinking in the development of communication skills, the contribution that these studies have had on academic and scientific development was also considered when evaluating the information that will contribute to this work.

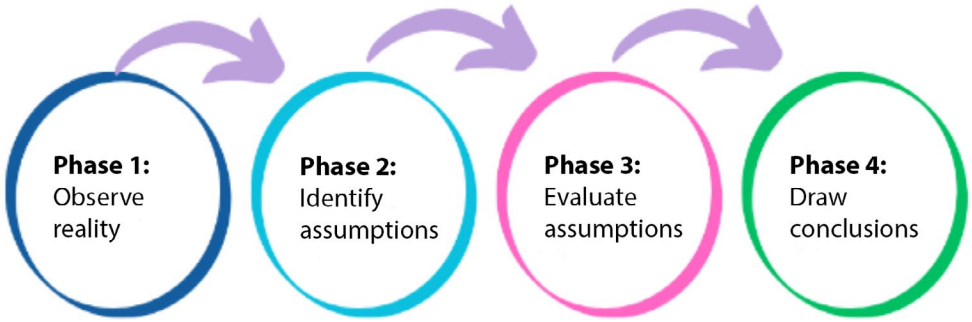
2.3. Synthesis and Analysis

In these two final stages of the SALSA Frameworks, the studies selected through inclusion and exclusion filters were gathered and compared to continue developing this work. The synthesis and analysis of the content allowed the information obtained to be relevant to teaching strategies to stimulate critical thinking in the development of communication skills. The synthesis and analysis could be presented through the extraction of important information and the use of tables or narrative summaries (Codina, 2023). However, in the present study, a systematic literature review was developed using the SALSA method to address issues related to teaching strategies to promote critical thinking in the development of communication skills.

The academic training of human beings has been developed with the objective of instructing and training them to face the eventualities that develop at the level of society, such that teachers are the main actors in charge of guiding and developing the reasoning of students. Over the years, it has been evident how the complexity of situations and knowledge are developed in each person and are fostered in a basic way until they reach the necessary complexity for students to be capable of acting at the level of higher education. Vera (2023), from a qualitative approach, proposes a work referring to “Active learning and critical thinking: Promoting student development in a private Chilean university” (p. 35). This study took into consideration the importance of active learning and critical thinking, adding that: “including the development of critical thinking in professional training generates a positive impact on academic success and the formation of committed citizens.” Additionally, the author proposed a four-phase critical thinking model, which is evidenced in *Figure 1*.

Figure 1

Critical Thinking Model.



Nota. From "Active Learning and Critical Thinking: Promoting Student Development at a Private Chilean University," by Vera (2023)

Classrooms are appropriate spaces for teachers to apply strategies that encourage students' critical thinking and reinforce these tactics through homework and activities or by applying virtual methods to improve reasoning and analysis. Arango et al. (2024) in their work regarding "New generations, new challenges: Innovating education in emergency medicine through technology", applied a descriptive study of the systematization of experiences to present a resource for the benefit of education focused on virtual simulation that sought to improve the methods applied in traditional education, the authors added that: "Implementing innovative educational strategies that promote curiosity and motivation are elements that can significantly improve active participation and commitment in the educational process" (p.6).

Delgado (2022) in his work on "Teaching strategies to strengthen creative thinking in the classroom", reviewing scientific literature in indexed journals, carried out a meta-analytical study, in which he argued that: "The most effective way for teachers to stimulate creative thinking in their pedagogical practice is by being creative themselves" (p. 52). For his part, Kwan (2022) in his work on "Teaching role and innovative teaching strategies with an emphasis on research", stated that teachers should not stagnate in implementing traditional teaching strategies, but "should use creativity to make classes fun and enjoyable, thus continuing to promote critical thinking in students" (p. 8).

By stimulating creativity, participants in the teaching-learning process are provided with alternatives that allow them to think critically and discuss possible problems and solutions. Additionally, educators must build appropriate scenarios to develop communication skills and be able to externalize information. This requires those involved in the teaching-learning process to adapt to the required means of expression and be prepared for each social moment and express their criteria (Rodríguez et al., 2023). The use of signs or symbols known to both the sender and the receiver reflects that the language must be understood by those involved to generate effective, two-way communication (Muevecela and Fuentes, 2024).

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Among the teacher's competencies, there is also mainly the promotion in their students of the appropriate forms of oral, written or gestural expression, specific areas such as language and literature are academic spaces responsible for the management of this type of communication skills. Cabrera and Tapia (2023) in their work regarding "Collaborative learning applied in the teaching of language and literature: enhancing participation and the development of skills", through documentary research, their analysis reflected that the integration of collaborative work improves the teaching-learning process because currently a better interrelation between students is sought, the authors maintained that: "Learning in the area of Language and Literature focuses on improving reading, writing, comprehension and literary analysis skills" (p. 3270), which allows the development of a communication competence that allows improving understanding in any communicative context. On the other hand, Tabernero and Colón (2023) set as their objective the reading of non-fiction books that favor critical thinking and other skills and propose the work: "Reading to think. The illustrated non-fiction book in the development of critical thinking" and added that in the subject of Spanish Language and Literature "the training of a competent, autonomous and critical reader is highlighted, capable of understanding and interpreting written and multimodal texts that allow him to face the challenges of today's information society" (p.4).

Valdez and Pérez (2021), in their study "Communication skills as a fundamental factor for social development," added that "it is essential to include the development of communication skills in teaching" (p. 436). This work, which applied a non-experimental design methodology and a systematic review with a qualitative descriptive level, concluded that with proper training in communication skills, they can be enhanced and, in turn, become an important resource for contributing to the advancement of society.

The strategies that have been frequently applied in the academic field to foster critical thinking are problem-based learning, analysis of written texts, case studies, and challenges. Applying these strategies has sought to develop skills such as analysis, comparison, synthesis, and evaluation, which allow students to solve problems and make better decisions (López et al., 2022). Furthermore, strategies such as critical reading in pairs, collaborative work, analysis of information from social and communication media, among other ways of fostering critical thinking in the development of communication skills, have been inserted into education. A clear example is the false content evident in social media, as these are highly valued elements when fostering critical thinking through the analysis of information and the teacher's guidance to differentiate between reality and malicious intent (Garcés et al., 2023).

Critical thinking involves a process with interrelated stages. It begins with an analysis of information to understand the situation or problem, then the information is interpreted and conclusions are drawn based on evidence and logic. The quality of the information content is then assessed, and finally, the arguments generated to seek problem resolution are clearly communicated, based on analysis and reasoning (Ilbay & Espinosa, 2024).

"The Importance of Critical Thinking and Problem-Solving in Contemporary Education" is a work carried out by Ilbay and Espinosa (2024) that aimed to analyze how critical thinking and problem-solving can be cultivated in the current educational field. Below, *Table 1* shows important

information from Ilbay and Espinosa (2024, pp. 13-14), which pointed out important information about how important critical thinking and problem-solving are in today's educational environment.

Table 1

Important Aspects of Critical Thinking and Problem Solving.

Aspect	Description
"Relevance of critical thinking"	"Critical thinking skills are fundamental to academic success and preparing students to face the challenges of the modern world."
"Analysis and questioning"	"The ability to analyze information thoughtfully and challenge preconceived ideas is essential in an environment of rapidly evolving information and complex problems."
"Understanding and participation"	"Critical thinking enables students to better understand the world and make informed decisions, enabling them to actively participate in society."
"Challenges in education"	"Promoting critical thinking faces challenges such as the need to adapt teaching practices and overcome traditional approaches focused on memorization and repetition."
"Interrelation with problem solving"	"The ability to effectively identify and address problems requires strong critical thinking and practical skills to develop innovative solutions."
"Pedagogical strategies"	"It is essential to integrate pedagogical strategies that foster both critical thinking and problem-solving to prepare students for the challenges of the 21st century."

Nota: The table emphasizes important aspects of critical thinking and problem-solving, also highlighting challenges and strategies. From "The Importance of Critical Thinking and Problem-Solving in Contemporary Education," by Ilbay and Espinosa (2024).

Teachers, being prepared to manage the teaching-learning processes, need to establish didactic strategies that allow students to identify, select, evaluate, and analyze relevant information and consequently learn from it (Soto and Chacón, 2022). The application of this type of strategies stimulates students' skills and encourages critical thinking, since, through academic participation, better cognitive development of the human being is achieved. Cárdenas et al. (2022) in their work regarding "Development of critical thinking: Methodology to promote learning in engineering", using a methodology called Desk Research, conducted a study in which they sought to formulate a methodological proposal to promote the development of critical thinking in engineering students. The authors maintained that: "The didactics of critical thinking requires active learning for the construction of knowledge" (p. 515). Therefore, the teaching-learning process plays an important role in the exchange of information and feedback between teachers and students.

During the teaching-learning process, a large amount of information is exchanged, which is why specialist teachers or research experts must assume a role in the academic system to innovate and improve the teaching strategies used in classrooms, or in turn adapt existing strategies through new methods, instruments, techniques and procedures (Mendoza and Rangel, 2022) that are beneficial to foster critical thinking in the development of communication skills.

Jiménez et al. (2021) proposed "Case studies to develop critical thinking" (p. 522) as a teaching strategy. In this work, a quantitative approach and quasi-experimental design were applied, in which 100 students were considered so that the aforementioned strategy could be applied through 18 learning sessions. It was evident that a high percentage of students reached an expected

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

level of achievement in the dimensions of critical thinking such as inference, explanation, and evaluation. The same authors added that thinking is of great relevance among the most essential competencies of the 21st century, for this reason "students are required to develop skills such as: Reasoning, argumentation, and problem-solving, which allow them to promote urgent changes in today's society" (Jiménez et al., 2021).

Teaching strategies have also been influenced by new technologies, as exemplified by GPT Chat. This technological resource can benefit participants in the teaching-learning process as long as it is used appropriately. This artificial intelligence functions as an educational aid, and above all, with its fluent language and close resemblance to human speech, it is ideal for fostering critical thinking in the development of communication skills (Atencio et al., 2023).

Continuing with teaching strategies, Gutiérrez (2021) proposed an "Active methodology as a teaching strategy in the development of critical thinking" (p. 8545). His research was applied under the scientific method and an experimental design with an explanatory level. The aforementioned author applied the strategy in a sample of 103 high school students and concluded that the active methodology significantly influences the development of critical thinking, in such a way that "when talking about critical thinking, it is necessary to understand that it is related to the intellectual character which is determined by the allusion to obtaining an open mind to different positions" (Gutiérrez, 2021). By applying this teaching strategy, students can develop skills such as interpretation and analysis when assimilating the information they are perceiving and questioning reasonable doubts and scientific truths.

Teachers must keep in mind that the selected teaching strategies need to have the student as their central axis, therefore, planning should focus on achieving academic objectives that favor the development of critical thinking (Morales, 2023). The appropriate selection of teaching strategies improves learning, since it encourages student participation in reasoning, analyzing, thinking and externalizing their ideas in a more structured and understandable way. González (2021) in his work regarding "Alternate realities: teaching strategies for the promotion of critical thinking in the face of educational hybridization" (p. 7) applied a qualitative methodology with an interpretive analytical method. His study concluded that education is experiencing modifications due to the arrival of a changing system and it is necessary to insert these new practices into the academic field; Furthermore, it was added that: "Through didactic strategies, which make use of digital and communication tools, the diagnosis of the context is facilitated for the development of critical thinking" (González, 2021), the dialogue and contextualization of situations or problems stimulates students' reasoning to provide better answers and solutions.

Teaching strategies have become important resources in education because they influence the development of critical thinking by stimulating reasoning, analysis, synthesis, reflection, and other skills that students develop throughout their academic careers. Activities such as reading comprehension, collaborative work, and information analysis, among others, foster critical thinking in humans. Teachers, as those responsible for guiding the teaching-learning process, are also responsible for developing communication skills so that students are prepared to respond and appropriately express concepts and ideas, ensuring that their messages are understood in different communication settings.

Results

Fostering critical thinking in humans leads to a better ability to respond to problems and situations that arise in society. Therefore, teachers need to implement teaching strategies that foster students' critical thinking and develop their communication skills so they can express and express their ideas and concepts clearly.

Teaching strategies applied in academic institutions need to stimulate students' abilities and intellect, ensuring that their activities are participatory, communicative, and foster critical thinking and the development of communication skills. By knowing how to reason and adequately analyze information, students need to externalize what they have learned in such a way that the message is structured in an understandable way. In certain contexts, they need to simplify or technicalize the content of the information so that the audience feels familiar with the terms and there is adequate feedback.

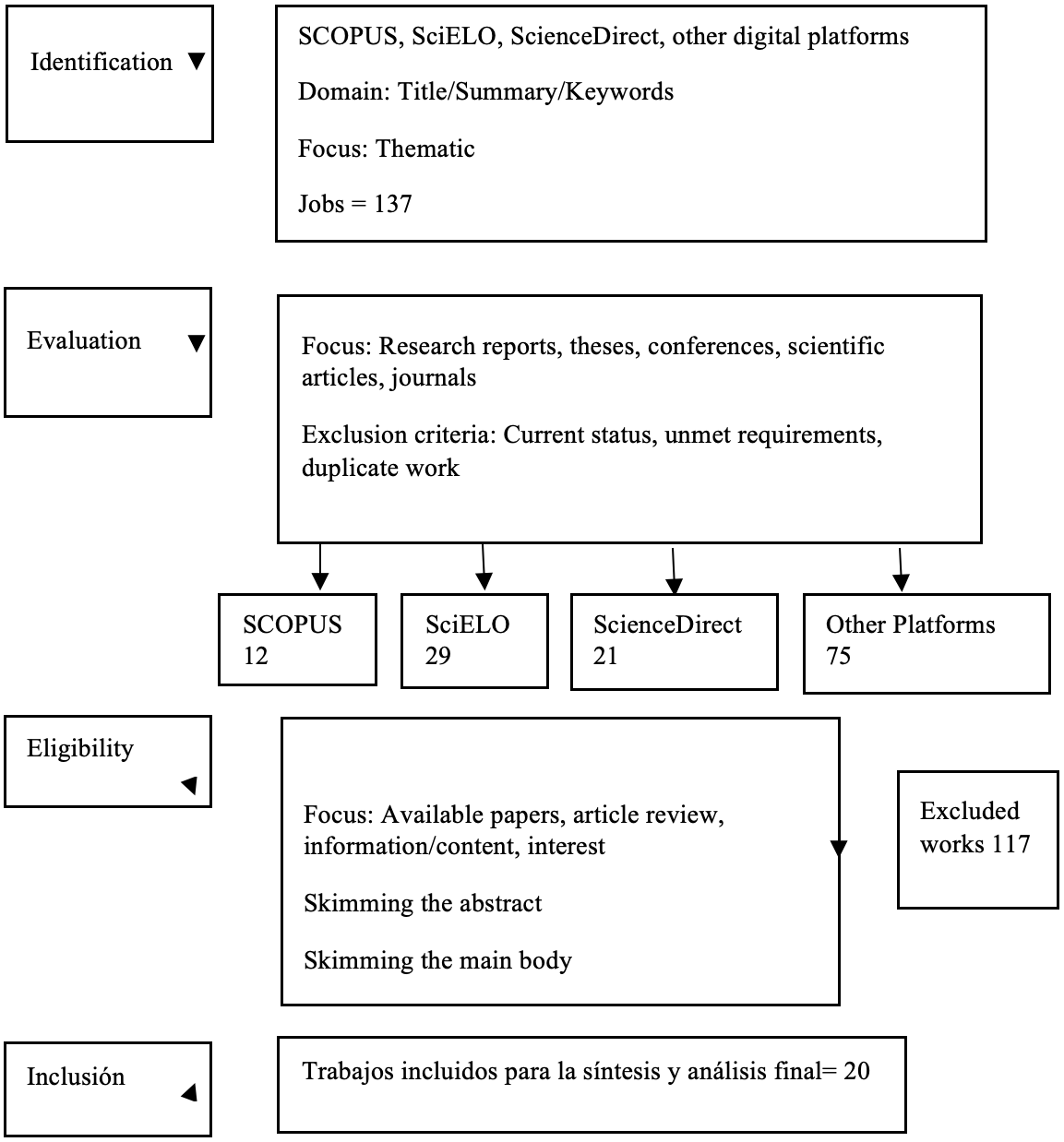
To understand the impact of teaching strategies on fostering critical thinking in the development of communication skills, 137 studies were initially obtained through a general search using the search engines and websites mentioned in the SALSA Frameworks. These studies, which contribute to the development of the proposed work, are shown in *Figure 2*.

In the information evaluation stage, applying the inclusion and exclusion criteria mentioned at the beginning of the systematic literature review process, 20 works were selected whose content is of great interest to support the present study and can be found in *Table 2*. These investigations enriched the present work, and the studies that were not selected were excluded due to outdated information or because the content did not contribute to the guidelines and requirements sought to develop the research. The results of this review show that it is necessary to periodically review and update the information regarding teaching strategies that help promote critical thinking in the development of communication skills, since their application influences the academic, personal and professional growth of human beings.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Figure 2

Studies Considered for Research.



Nota. The figure represents the selection process for the final papers that contribute to the development of the proposed study.

Table 2

Selected Studies.

#	Title	Author	Year	Thematic area
1	"Active Learning and Critical Thinking: Promoting Student Development at a Private Chilean University"	Vera	2023	Education
2	"New generations, new challenges: innovating emergency medicine education through technology"	Arango et al.	2024	Education and Medicine
3	"Teaching strategies to strengthen creative thinking in the classroom. A meta-analytic study."	Delgado	2022	Educación
4	"Teaching Role and Innovative Teaching Strategies with an Emphasis on Research"	Kwan	2022	Education
5	"Educational innovation with social networks applied to the subject of Public Health"	Rodríguez et al.	2023	Education and Health
6	"Weaving Bright Futures: Innovative Pedagogical Strategies to Enhance Mathematical and Communication Skills, Promoting Community Tourism that Supports Local Development"	Muevecela y Fuentes	2024	Education
7	"Collaborative learning applied to language and literature teaching: enhancing participation and skills development"	Cabrera y Tapia	2023	Education
8	"Reading to Think: The Nonfiction Picture Book for Developing Critical Thinking"	Tabernero y Colón	2023	Education
9	"Communication skills as a fundamental factor for social development"	Valdez y Pérez	2021	Communication
10	"Developing Critical Thinking in the Classroom: Testimonies from Excellent Ecuadorian Teachers"	López et al.	2022	Education
11	"Using social media to foster critical thinking in university students during COVID-19"	Garcés et al.	2023	Education and Communication
12	"The importance of critical thinking and problem-solving in contemporary education"	Ilbay y Espinosa	2024	Education
13	"Methodological strategies to promote critical thinking in students"	Soto y Chacón	2022	Education
14	"Developing Critical Thinking: A Methodology for Promoting Learning in Engineering"	Cárdenas et al.	2022	Education
15	"Foundation of research variables on the design and validation of a teaching strategy that applies critical thinking to learning development"	Mendoza y Rangel	2022	Education
16	"Case studies to develop critical thinking"	Jiménez et al.	2021	Education
17	"GPT Chat as a resource for learning critical thinking in university students"	Atencio et al.	2023	Education and Technology
18	"Active methodology as a teaching strategy in the development of critical thinking"	Gutiérrez	2021	Education
19	"Teaching strategies and the use of ICT in teaching practice"	Morales	2023	Education
20	"Alternate Realities: Teaching Strategies for Promoting Critical Thinking in the Face of Educational Hybridization"	González	2021	Education

Nota. The table represents the papers selected for the systematic literature review.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

The selected literature revealed research that demonstrates that teaching strategies are necessary to foster critical thinking and develop communication skills. Their academic and scientific influence makes them a topic of high interest, as they are responsible for stimulating students' reasoning, abilities, and skills. The systematic literature review revealed information showing activities that help foster critical thinking, including collaborative work, reading comprehension, and analyzing information to identify truth and malice. Overall, the authors of the selected papers agreed that fostering critical thinking helps individuals develop and empower them to function and express their reasoning in society.

The review also yielded important information regarding how teachers guide the teaching-learning process so that students develop skills and, through activities, communicate different concepts. However, there is limited information regarding how each academic area contributes to the development of critical thinking. Similarly, there is little information on how other types of communicative resources, such as gestures, should be managed, since most studies related to communication skills prioritize oral and written language. The fields of knowledge most closely related to the proposed work and identified in the systematic review were mathematics, language arts, and literature, as these are two areas directly related to the development of critical thinking and communication skills.

Updating information regarding teaching strategies to foster critical thinking and the development of communication skills is important for improving student performance. Over the years, it has become evident that new teaching strategies are being developed and adapted, even more so with technological advances and the digital age.

To conclude the synthesis and analysis of the proposed work, it was determined that the development of critical thinking and communication skills influence how a person develops in society. The procedures implemented in response to situations and problems depend on the analysis and reasoning the individual develops, and this is largely influenced by their academic background.

The 20 papers were selected because their research content was of academic and scientific interest, which helped inform the development of this study. The information available to the community aids in knowledge building, and it is necessary to generate or consume updated content to understand and apply new teaching strategies, with the goal of fostering critical thinking and developing communication skills to clearly and understandably communicate messages generated through reasoning and analysis. The information generated in this study demonstrated the impact of teaching strategies in the academic field and how their activities foster the development of critical thinking and communication skills. The studies prompted a systematic review of the literature due to their impact on strategic sectors such as education.

Conclusion

Education is oriented toward the academic, personal, and professional development of each individual, which is why it is necessary to implement teaching strategies that allow each student to unleash their potential. Collaborative work, reading comprehension, and other activities are used to foster critical thinking and develop communication skills.

Critical thinking influences how each person reacts to situations or problems that arise in society. To foster this capacity, teachers must intervene in the teaching-learning process with actions that encourage reasoning, analysis, synthesis, and other skills that aid in the construction of knowledge. By stimulating a person's cognitive capacity, it is possible to analyze and synthesize important information to subsequently act in different contexts and provide a more appropriate response to situations.

Communication skills provide students with the necessary foundation to express their ideas and concepts, developed through their reasoning and analysis, in a clear and understandable manner. This is why students need to navigate different scenarios throughout their academic careers to assimilate information and express their conclusions and responses orally, in writing, or through gestures.

People's cognitive abilities need to be stimulated through teaching strategies that develop critical thinking and communication skills. By fostering these abilities, students in their academic years are equipped to have the necessary resources to address social situations and problems in the most appropriate manner. They are also capable of expressing their opinions in an understandable and reasonable manner.

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

References

Arango, M., Muñoz, V., Guzmán, Á., Barrios, J., González, M., y Táquez, H. (2024). Nuevas generaciones, nuevos retos: innovando la educación en medicina de urgencias a través de la tecnología. *Educación Médica*, *25*(4), 1–8. https://doi.org/10.1016/j.edumed.2024.100921

Atencio, R., Bonilla, D., Miles, M., y López, S. (2023). Chat GPT como recurso para el aprendizaje del pensamiento crítico en estudiantes universitarios. *CIENCIAMATRIA*, *9*(17), 20–28. https://doi.org/10.35381/cm.v9i17.1121

Cabrera, E. y Tapia, S. (2023). Aprendizaje colaborativo aplicado en la enseñanza de la lengua y literatura: potenciando la participación y el desarrollo de competencias. *Ciencia Latina*, *7*(3), 3266–3282. https://doi.org/10.37811/cl_rcm.v7i3.6408

Cárdenas, J., Rodríguez, C., Pérez, J., y Valencia, J. (2022). Desarrollo del pensamiento crítico: Metodología para fomentar el aprendizaje en ingeniería. *Revista de Ciencias Sociales*, *28*(4), 512–530. https://dialnet.unirioja.es/servlet/articulo?codigo=8703859

Chancusig, F. y Granja, K. (2023). Estrategias para fomentar la creatividad y el pensamiento crítico en el aula. *Bastcorp International Journal*, *2*(1), 33–41. https://doi.org/10.62943/bij.v2n1.2023.26

Codina, L. (2023). *Revisiones de la literatura sistematizadas Scoping reviews con frameworks SALSA y PRISMA*.

Delgado, C. (2022). Estrategias didácticas para fortalecer el pensamiento creativo en el aula. Un estudio meta-analítico. *Revista Innova Educación*, *4*(1), 51–64. https://doi.org/10.35622/j.rie.2022.01.004

Garcés, J., García, E., Martínez, J., y Escobar, R. (2023). Uso de redes sociales para fomentar el pensamiento crítico en estudiantes universitarios durante el COVID-19. *Educación y Humanismo*, *25*(44), 17–34. https://doi.org/10.17081/EDUHUM.25.44.5763

González, G. (2021). Realidades alternas: estrategias didácticas para el fomento del pensamiento crítico ante la hibridación educativa. *Revista Dilemas Contemporáneos: Educación, Política y Valores*, *9*(1), 1–21. https://doi.org/10.46377/dilemas.v9i.2923

González, V. y Robalino, G. (2024). Modelo teórico de competencias comunicacionales para mejorar la enseñanza-aprendizaje de la lengua y literatura en la formación de docentes de la Universidad Estatal de Milagro, Ecuador. *Ciencia y Educación*, *5*(10), 38–52. https://doi.org/10.5281/zenodo.13888326

Gutiérrez, A. (2021). Metodología activa como estrategia didáctica en el desarrollo del pensamiento crítico. *Ciencia Latina Revista Científica Multidisciplinar*, *5*(5), 8538–8558. https://doi.org/10.37811/cl_rcm.v5i5.939

Ilbay, E. y Espinosa, P. (2024). La importancia del pensamiento crítico y la resolución de problemas en la educación contemporánea. *Kosmos*, *3*(1), 4–18. https://doi.org/10.62943/rck.v3n1.2024.50

Jiménez, L., Otiniano, R., y Pérez, M. (2021). El estudio de casos para desarrollar el pensamiento crítico. *Polo Del Conocimiento*, *6*(2), 521–540. https://doi.org/10.23857/pc.v6i2.2284

Kwan, C. (2022). Rol docente y estrategias didácticas innovadoras con énfasis en investigación. *Revista Multidisciplinar UP*, *3*(2), 78–81.

López, M., Moreno, E., Uyaguari, J., y Barrera, M. (2022). El desarrollo del pensamiento crítico en el aula: testimonios de docentes ecuatorianos de excelencia. *Revista Digital Del Doctorado En Educación de La Universidad Central de Venezuela*, *8*(15), 161–180. https://doi.org/10.55560/arete.2022.15.8.8

Mendoza, Y. y Rangel, F. (2022). Fundamentación de las variables de la investigación sobre el diseño y validación de una estrategia didáctica que aplica el pensamiento crítico para el desarrollo del aprendizaje. *Polo Del Conocimiento*, *7*(4), 1758–1775. https://dialnet.unirioja.es/servlet/articulo?codigo=8482992

Morales, W. (2023). Estrategias didácticas y el uso de las TIC en la práctica docente. *Revista Científica Del Sistema de Estudios de Postgrado de La Universidad de San Carlos de Guatemala*, *6*(1), 111–120. https://doi.org/10.36958/sep.v6i1.129

Muevecela, S., y Fuentes, C. (2024). Tejiendo futuros brillantes: Estrategias pedagógicas innovadoras para potenciar competencias matemáticas y comunicacionales, impulsando el turismo comunitario que respalden el desarrollo local. *LATAM Revista Latinoamericana de Ciencias Sociales y Humanidades*, *5*(2), 634–644. https://doi.org/10.56712/latam.v5i2.1905

Noboa, K. (2023). La terapia de reminiscencia como coadyuvante en el deterioro cognitivo del adulto mayor. *LATAM Revista Latinoamericana de Ciencias Sociales y Humanidades*, *4*(1), 4412–4418. https://doi.org/10.56712/latam.v4i1.579

Rodríguez, M., Huerta, P., Valencia, C., Montano, E., y Ortega, Y. (2023). Innovación educativa con redes sociales aplicada a la asignatura de Salud Pública. *Educación Médica*, *24*(3), 1–8. https://doi.org/10.1016/j.edumed.2023.100798

Soto, D. y Chacón, J. (2022). Estrategias metodológicas para promover el pensamiento crítico en los estudiantes. *Ciencia Latina Revista Científica Multidisciplinar*, *6*(3), 3006–3021. https://doi.org/10.37811/cl_rcm.v6i3.2434

Tabernero, R. y Colón, M. (2023). Leer para pensar. El libro ilustrado de no ficción en el desarrollo del pensamiento crítico. *Revista de Educación a Distancia*, *23*(75), 1–26. https://doi.org/10.6018/red.545111

e-ISSN: 2631 - 2786
rcientifica@uisrael.edu.ec

Valdez, W. y Pérez, M. (2021). Las competencias comunicativas como factor fundamental para el desarrollo social. *Polo Del Conocimiento*, *6*(3), 433–456. https://dialnet.unirioja.es/servlet/articulo?codigo=7926918

Vera, F. (2023). Aprendizaje activo y pensamiento crítico: Impulsando el desarrollo estudiantil en una universidad privada chilena. *Revista Electrónica Transformar*, *4*(3), 31–44. https://www.revistatransformar.cl/index.php/transformar/article/view/101

PUBLICATION GUIDELINES FOR UISRAEL SCIENTIFIC JOURNAL

The UISRAEL Scientific Journal is an academic publication of the Universidad Tecnológica Israel, which, since its first issue in 2014, has covered a wide range of topics, including tourism, administrative and economic sciences, engineering, as well as arts and humanities. However, it currently focuses on social sciences and their interdisciplinary fields (such as communication, education, sociology, anthropology, contemporary visual arts, psychology, ICT, law, etc.).

Published every four months—in January, May, and September—the journal accepts submissions in both Spanish and English to enhance its international reach. It is open-access and free of charge, including original research articles, essays, and reviews.

It is important to note that all submissions undergo a double-blind peer review process to ensure objectivity and quality in the publications.

1. SCOPE AND POLICY

Submissions must be original and must not have been previously published or be under review in another journal.

Submissions may be in the form of:

- **Articles:** These are theoretical and empirical works with a length of 12 to 16 pages, including the title, abstracts, keywords, tables, and references. The structure must follow this format: Title, Author(s), Institution, Email address of each author, ORCID code (https://orcid.org/), Abstract (translations from automated translators will not be accepted), Keywords, Introduction, Methodology, Results, Conclusions, and References..
- **Essays:** These are comprehensive reviews of the current state of research on a specific topic, justified through a systematic review of authors addressing the issue. Essays should be between 12 and 16 pages, including the title, abstracts, keywords, tables, and references. The structure must follow this format: Title, Author(s), Institution, Email address of each author, ORCID code (https://orcid.org/), Abstract (translations from automated translators will not be accepted), Keywords, Introduction, Development, Discussion/Debate/Conclusions, and References..
- **Reviews:** Reviews provide a critical assessment of an author, book, or artistic work, offering an evaluation or constructive critique. The maximum length is 12 pages, including the title, abstracts, keywords, tables, and references. The structure must follow this format:

Title, Author(s), Email address of each author, ORCID code (https://orcid.org/), Abstract (translations from automated translators will not be accepted due to their low quality), Keywords, Introduction, Development, Discussion/Debate/Conclusions, and References..

2. EDITORIAL PROCESS

Authors are informed that the works to be published must respect the format of the established template and must be submitted exclusively via OJS (Open Journal System): https://revista.uisrael.edu.ec/index.php/rcui, through which the process of acceptance/ rejection and estimation/ devaluation will be handled, as well as, in the case of acceptance, the review process.

Within a maximum period of 30 days from the receipt of each work, authors will receive a notification. In case the manuscript presents formal deficiencies or is not included in the thematic focus of the publication, the Editor-in-Chief or Scientific Director will formally or thematically dismiss the work without the possibility of appeal by the author. On the contrary, if there are superficial formal deficiencies, the work will be returned to the author for correction before the evaluation process begins. For this, the following categories are established: accepted, accepted with minor changes, accepted with major changes, rejected.

Authors are requested to send the corrected document within no more than 30 days for a second review, except for those authors who have been notified that their document was rejected.

The manuscripts will be scientifically evaluated anonymously by expert peers in the topic, in order to guarantee the objectivity and independence of the Journal.

The criteria for the acceptance/rejection of works by the Editorial Board are the following:

a. Timeliness and novelty.
b. Relevance and significance: advancement of scientific knowledge.
c. Originality.
d. Reliability and scientific validity: proven methodological quality.
e. Organization (logical coherence and formal presentation).
f. Co-authorship and degree of internationalization of the proposal and the team.
g. Presentation: good writing.

3. SUBMISSION AND STRUCTURE OF ORIGINALS

The works should be submitted in Times New Roman font, size 12, single-spaced, with left alignment and no tabulators or line breaks between paragraphs. Only major blocks (author, title, abstract, descriptors, credits, and epigraphs) should be separated with a line break.

The works should be submitted in Word format for PC. The citation and bibliography standards are based on APA 7th edition.

Below, the detailed structure for the academic text is described:

- Full names and surnames of each author (maximum 4) in order of priority; the number of authors should be justified by the theme, complexity, and extension. Along with the names, the institution, email of each author, and ORCID code should follow.
- Abstract in Spanish with a maximum of 200 words, which will concisely describe the reason and objective of the research, the methodology used, the most significant results, and main conclusions, with the following structure: justification of the topic, objectives, methodology of the study, results, and conclusions. It should be written impersonally in the third person: "The present work was analyzed…".
- Abstract in English with a maximum of 200 words. For its elaboration, as with the title and keywords, the use of automatic translators is not allowed. Reviewers will also consider this factor when evaluating the work.
- 4-6 keywords in Spanish / 4-6 keywords in English.
- Introduction: should include the foundations and purpose of the study, using bibliographic citations, as well as the review of the most significant literature from valid and high-quality sources.
- Methodology: should be presented with enough detail for the reader to understand and confirm the development of the research. The adopted methodological approach, population and sample, and selected techniques should be described.
- Results: should present the information gathered during the research process. If necessary, the results should be presented in figures and/or tables.
- Conclusions: should summarize the findings, relating the observations to other studies of interest, pointing out contributions and limitations without repeating data already discussed in other sections.
- References: citations should be listed as references to the text. Bibliography not cited in the text should not be included. The number of bibliographic references should be at least 12 and no more than 20, the necessary amount to contextualize the theoretical framework, methodology used, and research results. References should be presented alphabetically by the first author's last name (adding the second name only if the first is too common). APA 7th edition guidelines should be followed.
- Financial support (optional): The Council Science Editors recommends that authors specify the source of funding for the research. Works backed by national or international competitive projects will be considered a priority. In any case, for the scientific evaluation of the manuscript, it must be anonymized with XXXX only for the initial evaluation, so as not to identify authors and research teams, which should be explicitly mentioned in the final manuscript.

4. COPYRIGHT

Authors participating in the evaluation and publication processes retain their copyright, granting the journal the right to the first publication, as established by the conditions of recognition in the Creative Commons License 4.0 International (CC BY), where authors authorize free access to their works, allowing readers to copy, distribute, and transmit through various media, ensuring broad dissemination of the published scientific knowledge.

5. SUBMISSION CHECKLIST

Researchers must complete the submission checklist in OJS. If any requirement is not met, the author will not be able to upload the file. Therefore, it is necessary to review the following parameters before submitting the document.

- The submission has not been previously published nor is it under consideration by any other journal (or an explanation has been provided in the editor's comments).
- The submission file is in Microsoft Word format, according to the established style template.
- Whenever possible, URLs for references are provided.
- The text is left-aligned with single spacing; Times New Roman font, size 12.
- The text adheres to the stylistic and bibliographic requirements summarized in the Author Guidelines.
- If submitted to a peer-reviewed section of the journal, the instructions for ensuring anonymous evaluation should be followed.

6. DISHONEST PRACTICES: PLAGIARISM AND SCIENTIFIC FRAUD

In case of any infringement against intellectual property rights, the actions and procedures arising from this situation will be the responsibility of the authors. In this regard, the following serious infractions should be noted:

- Plagiarism: copying ideas or works from others and presenting them as one's own, such as adopting words or ideas from other authors without due recognition, not using quotation marks for a literal quote, giving false information about the true source of the quote, paraphrasing a source without mentioning it, abusive paraphrasing, even if the source is mentioned.
- Scientific fraud: the fabrication, falsification, or omission of information, data, as well as duplicate publication of the same work and authorship conflicts.

CITATION AND BIBLIOGRAPHIC REFERENCES

The citation and bibliographic reference system should follow the American Psychological Association (APA, 7th edition) standards.

- The order of authors as listed in the original document submitted will be implicitly respected.

Francisco Pizarro E4-142 and Marieta de Veintimilla
Phone: (593) 2 255-5741
rcientifica@uisrael.edu.ec
Quito - Ecuador