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Implications of research skills in higher education: A systematic review

Implicancias de las habilidades investigativas en la educación superior: una revisión sistemática

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Abstract

The development of research skills is a fundamental pillar of higher education, as it strengthens the comprehensive, critical, and scientific training of future professionals. In this context, the use of technological resources and problem-solving methods are consolidated as effective tools that promote active participation, deep understanding, and a positive attitude toward research. Therefore, this article aims to analyze the implications of research skills in higher education. To this end, a PRISMA methodology was employed, with inclusion criteria based on publications from 2020 to 2025 and the Scopus and SciELO databases, considering works in English, Spanish, and Portuguese. Closed-access articles and publications prior to 2020 were excluded. From the initial total of 144 articles, 21 were selected for detailed analysis: 8 from Scopus and 13 from SciELO. The results show that academic and training factors positively influence the development of these skills, while a lack of training, limited personal time, and constant stress negatively affect the motivation, concentration, and analytical capacity necessary for research. In conclusion, enhancing research skills in higher education requires not only promoting appropriate tools and methods but also addressing the personal and training conditions that foster optimal research performance.

Keywords: strategies, research skills, university students.

Resumen

El desarrollo de habilidades investigativas es un pilar fundamental en la educación superior, pues fortalece la formación integral, crítica y científica de los futuros profesionales. En este contexto, el uso de recursos tecnológicos y el método de resolución de problemas se consolidan como herramientas eficaces que promueven la participación activa, la comprensión profunda y una actitud positiva hacia la investigación. De allí que, este artículo tiene como objetivo analizar las implicancias de las habilidades investigativas en la educación superior. Para ello, se empleó una metodología PRISMA, con criterios de inclusión basados en los años 2020-2025 y en las bases de datos Scopus y Scielo, considerando trabajos en inglés, español y portugués. Se excluyeron artículos de acceso cerrado y publicaciones anteriores a 2020. Del total inicial de 144 artículos, se seleccionaron 21 para

el análisis detallado: 8 de Scopus y 13 de Scielo. Los resultados evidencian que factores académicos y formativos influyen positivamente en el desarrollo de estas habilidades, mientras que la falta de capacitación, el limitado tiempo personal y el estrés constante afectan negativamente la motivación, la concentración y la capacidad analítica necesarias para la investigación. En conclusión, potenciar las habilidades investigativas en la educación superior requiere no solo promover herramientas y métodos adecuados, sino también atender las condiciones personales y formativas que favorecen un desempeño óptimo en la investigación.

Palabras clave: estrategias, habilidades investigativas, universitarios.

Introduction

Research skills have increasingly drawn attention in the training and selection of future professionals (Gerhardson et al., 2025). Similarly, a significant deficiency has been identified in pedagogical training and mentorship abilities among university teaching assistants specialized in research, posing a challenge to educational quality. Many programs lack strategies that encourage a mentoring mindset, thereby limiting motivation, collaboration, and effective support between teachers and students. This situation underscores the global need to strengthen professional development to cultivate research skills and create more equitable and supportive learning environments (Sarvary et al., 2025).

Moreover, these skills face the challenge of effectively integrating theory with professional practice, as many curricula still fail to fully develop key competencies such as communication, research, and educational management. This limitation hampers the performance of future educators in diverse contexts, highlighting an international issue that demands more integrative and contextualized curricula to enhance professional training and the quality of learning (Molano-Tobar et al., 2025).

Furthermore, the use of artificial intelligence (AI) in academic writing presents an increasingly relevant challenge. While AI can enhance writing skills and improve students' efficiency, it also raises concerns regarding the potential decline in critical thinking and analytical capabilities. This tension reflects a global debate on how to ethically integrate AI into education without compromising the intellectual development and academic autonomy of students (García-González et al., 2025).

Additionally, research skills encompass critical thinking, knowledge management, and the ability to generate, analyze, and communicate scientific information. These skills are cultivated through reflection, active practice, and the resolution of real-world problems, enabling students to transform knowledge into innovation. Such competencies extend beyond merely mastering methods and techniques; they also foster curiosity, argumentation, and co-creation of knowledge, promoting a research culture that facilitates autonomous and collaborative learning (Pastora et al., 2025).

Overall, research skills encompass cognitive, methodological, and technological capabilities that enable students to identify, analyze, and resolve problems through systematic inquiry processes. These include the appropriate use of digital tools, critical interpretation of data, and the integration of knowledge to generate academic or practical contributions. In virtual contexts, their development is closely tied to adaptability, self-directed learning, and the application of technological environments that foster interaction and analytical thinking (Cruz et al., 2025).

In light of the issues presented, the objective of this study is to analyze the implications of research skills in higher education.

Methodology

The methodology employed in this study utilized the PRISMA protocol, using search engines with Boolean operators AND. The selected keywords were "research skills" AND "strategies" as well as "habilidades investigativas" AND "university students," considering articles in both English and Spanish.

Inclusion criteria established the use of the Scopus and Scielo databases, encompassing publications from 2020 to 2025. Conversely, exclusion criteria ruled out articles with restricted access and those published before 2020.

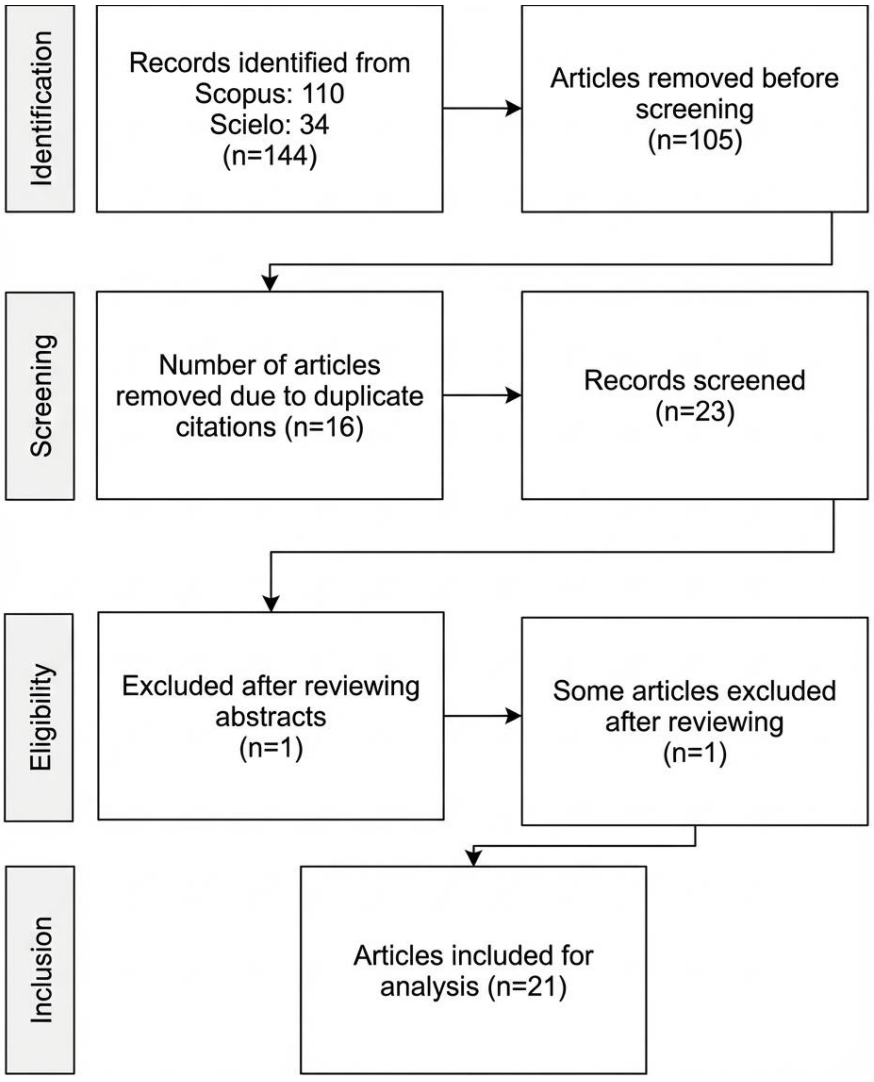
For the analysis and interpretation of the results, a total of 21 articles were selected, comprising 8 from Scopus and 13 from Scielo, based on an initial pool of 144 studies (see Table 1).

Table 1
Search strings in database articles

Database	Search Term	Results	Selected
Scopus	"investigative skills" AND “university students”	78	4
	"habilidades investigativas" AND "estrategias"	32	4
Scielo	"investigative skills" AND “university students”	34	13
Total		**144**	**21**

Additionally, Figure 1 presents the flowchart that describes the selection process of articles according to PRISMA guidelines.

Figure 1
Flowchart for Article Selection According to PRISMA



Note. Table formatted following PRISMA format using original data

Results

The results section presents a detailed analysis of the findings extracted from the selected studies, which provide valuable evidence on the implications of research skills in higher education. These outcomes significantly contribute to enriching the existing literature by offering new perspectives and relevant data that facilitate a deeper understanding of the development and application of these competencies in academic contexts. Through this analysis, we aim to identify patterns, strengths, and challenges related to research training, which can guide future strategies for enhancing higher education in this area.

Table 2

Implications of research skills in higher education

No.	Author	Implications of research skills
1	Kowalczuk-Walędziak et al. (2025)	The preparation of future educators through research-based practices is a key strategy for strengthening their skills. However, challenges remain in fully incorporating this approach into training programs, highlighting the need to promote pedagogical strategies that connect theory with research practice.
2	Obilade et al. (2024)	Emotional well-being and academic conditions significantly influence students' development of research skills. Work overload, lack of personal time, and constant stress can diminish motivation, concentration, and analytical ability essential for research. Therefore, it is crucial for educational institutions to promote a balance between academic demands and mental health, ensuring a conducive environment for learning and research practice.
3	Paucar-Curasma et al. (2024)	The use of technological resources and problem-solving methods facilitates the development of research skills in students by improving their attitude, comprehension, and participation in research activities.
4	Alva et al. (2024)	The lack of training, awareness, and educational programs in environmental management limits the development of research and sustainability skills in students, underscoring the need to strengthen institutional training to foster an active environmental culture.
5	González et al. (2024)	The development of research skills in health rehabilitation students supports a more comprehensive, critical, and scientific training, validating their importance within contemporary higher education.
6	McIntyre et al. (2024)	The use of educational models and structured methodologies, such as the CTA, enhances practical learning and improves the research and technical training of students, demonstrating its effectiveness as a strategy for developing competencies in university teaching environments.
7	Al-Kreimeen (2024).	The application of innovative teaching strategies, such as the PDEODE model, has proven highly effective in strengthening students' research skills. Results indicate that those trained under this approach developed significantly greater capacities for analytical thinking and problem-solving.
8	Farfán-Córdova et al. (2024)	The development of research competencies in university students largely depends on the instruments used to evaluate them. It is observed that most current tools focus on technological and procedural competencies, limiting a comprehensive assessment of the research process.
9	Coleman et al. (2024)	The development of research and professional skills among students does not solely rely on academic content but also on emotional and relational factors present in practical experiences. The application of the theory of human relatedness shows that feelings of belonging, reciprocity, and connection with the learning environment directly influence self-confidence, motivation, and effectiveness in clinical practice.

10	Herrera et al. (2024)	Implementing structured pedagogical strategies aimed at developing research skills is essential for strengthening students' scientific training. Applying a method based on clinical and epidemiological approaches allowed for the integration of research into professional practice from the formative stage, generating a more conscious, reflective, and applicable learning experience in the medical field.
11	Jaeger-Helton et al. (2023)	The "Cornerstone to Capstone" model enhances research skills by integrating practice and theory from the earliest years of training. It underscores the need for continuous strategies that foster planning, ethical reflection, and research-based learning.
12	Pradhananga et al. (2023)	The lack of training in forensic engineering within university programs limits future engineers' development of research and analytical skills. The absence of specialized courses and technical, legal, and communicative competencies directly impacts their professional preparation. Hence, there is a need for a more comprehensive training approach that enhances these skills and responds to current labor and scientific demands.
13	Vitor et al. (2023)	Strengthening university students' research skills shows a positive and significant correlation with increased motivation, interest, persistence, and the ability to conduct research processes, highlighting the influence of emotional and attitudinal factors on academic and scientific performance.
14	Romaní et al. (2023)	The application of curricular strategies focused on the critical reading of scientific literature significantly contributes to the development of research skills. As students read more original articles, their ability to seek, identify, and analyze relevant scientific information improves, thereby enhancing their autonomy and confidence in research practice.
15	Epiquién et al. (2023)	Formative research acts as a determining factor in strengthening university students' research skills. The implementation of practice- and observation-based strategies resulted in significant improvements in participants' performance, confirming that active learning and participation in research processes directly influence the development of scientific competencies during professional training.
16	Serrano-Estrada et al. (2023)	Research skills in students not only enhance their academic learning but also prepare them to navigate real-world contexts with autonomy and judgment, where information is abundant and requires rigorous and critical analysis.
17	Sánchez et al. (2023)	Research skills not only promote autonomy and critical thinking but also foster a more ethical and conscientious academic practice, reaffirming their essential role in the holistic development of university students.
18	Núñez-Pacheco et al. (2023)	Research skills are fundamental to university education, as they enhance critical thinking, autonomy, and the production of scientific knowledge. Their development through structured teaching and practical academic writing practice directly contributes to students' professional and academic growth.
19	Enríquez et al. (2023)	It strengthens the student's ability to develop critical thinking, analyze information, and generate new knowledge. Formative research, combined with institutional and teaching support, directly contributes to achieving these competencies, demonstrating that practice-oriented teaching significantly improves the quality of learning and academic output in higher education.
20	Valderrama et al., (2023)	Strategies such as collaborative work, tutoring, and timely feedback are key to strengthening these skills, demonstrating that their acquisition not only facilitates research practice but also contributes to the comprehensive development of the student.

21	Antunes et al. (2021)	Engaging in research at earlier stages of the academic career generates a positive influence on critical reflection, autonomous learning, and knowledge transfer. Therefore, fostering the teaching of qualitative research is crucial for consolidating research competencies and enhancing professional training in higher education.

Factors influencing research skills in students

The results obtained highlight various factors that influence the development of research skills among students, providing valuable insights for future research in this field. First and foremost, it is recognized that these skills are affected by a wide range of elements, encompassing both emotional and academic dimensions. In this context, emotional well-being and academic conditions play a critical role, as work overload, lack of personal time, and constant stress can diminish motivation, concentration, and the analytical capability necessary for research. Therefore, it is essential that educational institutions promote a proper balance between academic demands and mental health, thereby ensuring a conducive environment for learning and research practice (Obilade et al., 2024).

Similarly, insufficient training and lack of programs focused on environmental management limit the development of research skills oriented towards sustainability, highlighting the urgent need to strengthen institutional training to foster an active research and environmental culture (Alva et al., 2024).

Regarding the evaluation tools for research competencies, these directly influence their development. Most available tools mainly focus on technological and procedural competencies, which hinders a comprehensive assessment of the entire research process (Farfán-Córdova et al., 2024). Moreover, emotional and relational factors present in practical experiences also positively impact this strengthening. According to the theory of "human relatedness," feelings of belonging, reciprocity, and connection to the learning environment enhance students' self-confidence, motivation, and effectiveness in research (Coleman et al., 2024).

On the other hand, the absence of specialized training in technical areas limits the analytical and research skills of future professionals. The lack of specific courses and legal and communicative competencies directly impacts their preparation, demonstrating a clear need for broader training that aligns with labor market and scientific demands (Pradhananga et al., 2023). In this same context, motivation emerges as an essential factor for strengthening research skills, given the positive correlation between academic motivation levels and the development of scientific and attitudinal competencies (Vitor et al., 2023). Finally, formative research plays a key role, as active learning and direct participation in research processes significantly enhance scientific competencies during professional training (Epiquién et al., 2023).

Importance of research skills in students

Research skills are fundamental for students' personal and professional development, also aiding in the resolution of challenges inherent in the academic process. Thus, the development of these skills is an essential pillar of higher education, as it strengthens a comprehensive, critical, and scientific training for future professionals. In fields such as health, for example, these competencies enable rehabilitation students to understand, analyze, and apply knowledge from a reflective and evidence-based perspective, significantly enhancing their academic and professional preparedness (González et al., 2024). Furthermore, these skills not only improve academic learning but also prepare students to navigate diverse contexts with autonomy and judgment, where rigorous and critical analysis of information is required (Serrano-Estrada et al., 2023).

In this regard, research skills become increasingly important as they encourage ethical, conscious, and committed academic practices that generate scientific knowledge. Their development promotes critical thinking, autonomy, and reflexivity, thereby solidifying their role in the integral formation of university students (Sánchez et al., 2023). Moreover, structured and practical teaching of academic writing directly contributes to professional growth, strengthening fundamental competencies necessary for clearly and coherently communicating research findings (Núñez-Pacheco et al., 2023).

Additionally, formative research emerges as a fundamental component for consolidating these competencies, as faculty support and institutional backing drive teaching aimed at research practice, elevating the quality of learning and academic output (Enríquez et al., 2023). Within this process, strategies such as collaborative work, tutoring, and timely feedback are established as key factors in strengthening scientific competencies (Valderrama et al., 2023). Finally, early incorporation of research teaching, especially through qualitative approaches, has a positive impact on critical reflection, autonomous learning, and knowledge transfer, emphasizing the importance of fostering these skills from the earliest stages of university education (Antunes et al., 2021).

Strategies for developing research skills in students

To develop research skills in students, it is paramount to implement strategies that facilitate both their learning and the teaching efforts directed towards this goal. In this sense, strengthening such skills requires the application of pedagogical strategies that integrate theory with practice, promoting active and meaningful learning. For instance, in teacher training, research-based practices are a crucial axis for cultivating critical and analytical competencies. However, challenges persist in fully incorporating this approach into training programs, underscoring the need to promote methodologies that articulate theoretical knowledge with research praxis (Kowalczuk-Walędziak et al., 2025). Along these lines, the use of technological resources and problem-solving methodologies have proven to be effective tools by enhancing participation, comprehension, and a positive attitude toward research (Paucar-Curasma et al., 2024).

Similarly, the implementation of structured educational models has shown high efficacy in the development of scientific competencies. For example, the CTA model strengthens practical and technical learning, providing more robust research training in university contexts (McIntyre et al., 2024). Furthermore, innovative didactic strategies, such as specific educational models, enhance analytical thinking and problem-solving, driving students' scientific reasoning and critical capacities (Al-Kreimeen, 2024). These methodologies demonstrate that a structured and dynamic approach fosters a profound understanding of the research process.

Moreover, integrating clinical and epidemiological methods in teaching connects research with professional practice from early stages, encouraging conscious and contextualized reflection (Herrera et al., 2024). In this framework, the "Cornerstone to Capstone" model emphasizes the importance of progressively linking theory and practice, promoting planning, ethics, and research-based learning throughout the entire university training (Jaeger-Helton et al., 2023). Lastly, including curricular strategies centered on critical reading of scientific literature enhances students' autonomy, search, and analysis of relevant information, thereby strengthening their confidence in research activities (Romaní et al., 2023). Complementarily, fostering the teaching of qualitative research from the early stages enhances critical reflection, autonomous learning, and knowledge transfer, thereby solidifying a more comprehensive and scientific university education (Antunes et al., 2021).

Conclusions

Several factors positively influence the development of research skills, notably academic and formative aspects. However, there are also elements that exert a negative influence, such as insufficient training, a lack of programs in environmental management, personal time constraints, and constant stress, which can diminish the motivation, concentration, and analytical ability essential for research.

In this context, formative research emerges as a fundamental component, as active learning and direct participation in research processes significantly contribute to strengthening scientific competencies during professional training. The importance of research skills lies in their role as a central axis within higher education, promoting a comprehensive, critical, and scientific training for future professionals. Moreover, these competencies not only enhance academic learning but also prepare students to operate with autonomy and critical thinking in contexts where information is diverse and requires rigorous analysis.

Regarding strategies aimed at developing these skills, the use of technological resources and problem-solving methodologies are highlighted as effective tools that foster participation, deep understanding, and a positive attitude toward research. Additionally, the application of well-structured educational models has proven to be highly effective in consolidating scientific competencies. Finally, integrating curricular strategies focused on the critical reading of scientific literature facilitates student autonomy, enabling them to seek and analyze relevant information, thereby strengthening their confidence and performance in research activities.

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