Critical thinking in students and its implications in educational contexts: a systematic study of the literature

El pensamiento crítico en estudiantes y sus implicancias en los contextos educativos: un estudio sistemático de la literatura

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Abstract

The central objective of this study was to analyze the implications of critical thinking strategies applied by students in educational contexts. To this end, a systematic review methodology based on PRISMA guidelines was used. Inclusion criteria were established that considered articles published between 2020 and 2025 in the Scopus and SciELO databases. Ultimately, 11 articles were selected from Scopus and 15 from SciELO, for a total of 26 studies analyzed. The results indicate that critical thinking is manifested in students' ability to analyze and understand diverse perspectives on knowledge, as well as to evaluate different positions and arguments, even those that challenge their own beliefs. Strategies that promote the development of critical thinking include the implementation of active methodologies such as the flipped classroom, problem- and project-based learning, the use of educational technologies, and cooperative work. Likewise, inquiry-based learning and reading with a critical-reflective approach enhance this skill. Other relevant techniques include the use of metacognitive strategies, the preparation of academic and philosophical essays, participation in debates on various topics, argumentation, analysis, problem-solving, and critical evaluation. Finally, the importance of empowering stakeholders in the

educational process through innovative tools that promote critical thinking, moving away from traditional teaching and learning methods, is highlighted.

Keywords: learning, strategies, critical thinking.

Resumen

El objetivo central del presente estudio fue analizar las implicancias de las estrategias de pensamiento crítico aplicadas por estudiantes en contextos educativos. Para ello, se empleó una metodología de revisión sistemática basada en los lineamientos PRISMA. Se establecieron criterios de inclusión que consideraron artículos publicados entre 2020 y 2025 en las bases de datos Scopus y SciELO; finalmente, se seleccionaron 11 artículos de Scopus y 15 de SciELO, para un total de 26 estudios analizados. Los resultados indican que el pensamiento crítico se manifiesta en la capacidad de los estudiantes para analizar y comprender diversas perspectivas del conocimiento, así como para evaluar distintas posturas y argumentos, incluso aquellos que desafían sus propias creencias. Entre las estrategias que favorecen el desarrollo del pensamiento crítico destacan la implementación de metodologías activas como el aula invertida, el aprendizaje basado en problemas y proyectos, el uso de tecnologías educativas y el trabajo cooperativo. Asimismo, el aprendizaje basado en la indagación y la lectura con un enfoque crítico-reflexivo potencian esta habilidad. Otras técnicas relevantes incluyen el uso de estrategias metacognitivas, la elaboración de ensayos académicos y filosóficos, la participación en debates sobre temas variados, la argumentación, el análisis, la resolución de problemas y la evaluación crítica. Finalmente, se resalta la importancia de empoderar a los actores del proceso educativo mediante herramientas innovadoras que promuevan el pensamiento crítico, alejándose de los métodos tradicionales de enseñanza y aprendizaje.

Palabras clave: aprendizaje, estrategias, pensamiento crítico.

Introduction

Globally, there is a growing concern regarding the limited development of critical thinking skills among students. This issue may be linked to various structural factors that hinder its promotion, such as the physical conditions of educational institutions, the arrangement of furniture, curriculum management, class loads, as well as the individual characteristics of students, their social environments, and the multiple responsibilities faced by teachers (Mendoza, 2021). In this context, the 2018 PISA report indicated that students in Spain achieved low results in their learning outcomes. In response to this situation, the Spanish Ministry of Education has set the goal of reducing memorization-based teaching and promoting the development of critical thinking (Menárguez, 2021).

Furthermore, in Latin America, there persists a disconnect between public policies aimed at teacher training and the concrete realities of their implementation in the classroom (Oviedo & Páez, 2020). In fact, there is an urgent need to rethink teacher training strategies in the region, as current reforms do not adequately address key aspects such as who teaches and the quality of the content delivered. In this regard, it is crucial that educators adopt approaches that integrate critical thinking into their teaching practices (Benavides & Ruiz, 2022). To effectively teach these skills, educators must first develop them within themselves (Bañuelos, 2017). Additionally, it is essential to understand teachers' perceptions of these competencies, as well as the factors that influence their implementation, including skills such as problem-solving and creativity (Heffington et al., 2023).

Particularly, education in Latin America, and especially in Peru, needs to be viewed from a different perspective to intervene effectively and achieve a competency-based approach, where the strengthening of critical thinking is a fundamental pillar in higher education (Novoa & Sandoval, 2023). The urgency to promote an education that fosters reasoning among students is evident, with the aim of strengthening their critical thinking, especially in the school environment. Therefore, it is necessary for the national education system to prioritize the development of this key competency (Chimoy et al., 2023). Notably, after two years of suspension of in-person classes due to the COVID-19 pandemic, the country has suffered significant learning losses, estimated by the World Bank to be equivalent to a setback of ten years (UNICEF, 2022).

In this framework, the research question posed was: What are the areas of critical thinking among students in educational contexts? Therefore, the objective of the study was to analyze the implications of students' critical thinking in these contexts.

Methodology

For the development of this study, a systematic review methodology was adopted, rigorously following the protocol established by PRISMA, which allowed for the presentation of results in a clear and structured manner. Regarding the selection of studies, inclusion criteria were defined, considering articles available in the Scopus and SciELO databases, using the keywords “critical thinking” AND “students.” Moreover, only open-access articles written in English or Spanish and published between 2020 and 2025 were included. Conversely, exclusion criteria ruled out articles published before 2020, as well as those with restricted access.

The initial search yielded a total of 3,292 articles in Scopus and 247 in SciELO. After applying the selection criteria, 11 articles from Scopus and 15 from SciELO were ultimately considered, resulting in a total of 26 studies that supported the analysis presented (see Table 1).

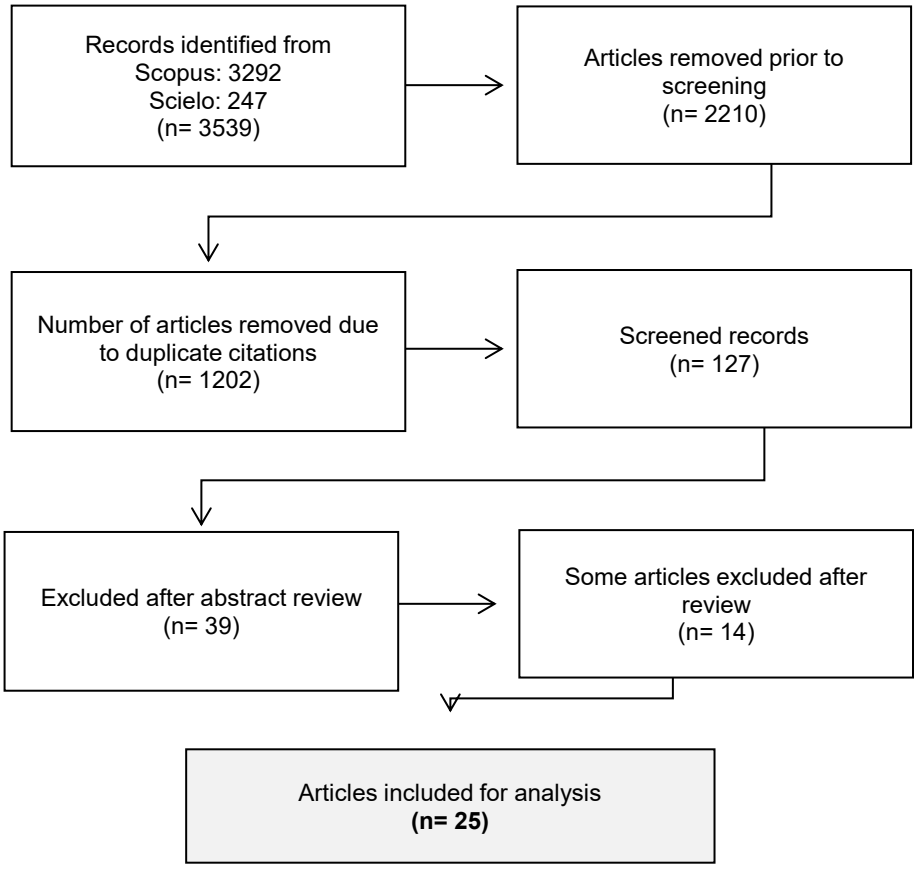
Table 1

Search chain in database articles

Database	Search Terms	Result	Selected
Scopus	"critical thinking" AND "students"	3292	11
Scielo	" critical thinking" AND "students"	247	14
	Total	**3539**	**25**

Figure 1

Flow diagram for article selection according to PRISMA



Results

Table 2
Implications of critical thinking

No.	Author	Implications of critical thinking
1	Tasayco et al. (2024)	The results demonstrated that critical thinking is reflected in students' ability to analyze and understand different perspectives of knowledge. This entails the capacity to evaluate diverse viewpoints and arguments, including those that may challenge their own beliefs.
2	Vendrel (2023)	The development of critical thinking fosters the construction of a more reflective and engaged society in social, ethical, and environmental domains.
3	Hutsalo et al. (2024)	Ensuring the development of critical thinking is an essential factor in shaping students' professional and educational growth, promoting better quality learning, improved assimilation of educational material, and application of knowledge in practical settings.
4	Saavedra (2024)	The development of critical thinking is an essential skill that students must acquire from the early stages of their education.
5	Sharma et al. (2022)	Individuals can use critical thinking skills to organize information, including facts, to identify and resolve problems.
6	Vázquez et al. (2023)	An improvement in the perception of achievement in complex thinking competence and its sub-competencies among students, with critical thinking achieving the best results in relation to overall well-being.
7	Quispe (2025)	Critical thinking is a key capability for shaping students with a reflective and analytical attitude, which is highly required in secondary education to address the challenges of a constantly changing context.
8	Deroncele et al. (2020)	It is imperative to transition toward an education that is ethical, strategic, participatory, and interactive, where critical thinking is valued as an intrinsic formative capacity of every individual, and its development and management are promoted.
9	Prakong (2024)	Critical thinking plays a crucial role in enhancing students' problem-solving abilities, particularly in higher education, where they are increasingly expected to address complex real-world issues.
10	López et al. (2022)	Critical thinking among university students is essential and constitutes a key requirement for decision-making and problem-solving. Additionally, it is fundamental to implement cross-disciplinary academic programs that enhance creative thinking, especially in business-related fields.
11	Núñez et al. (2020)	Critical thinking, composed of the subcategories of reasoning, argumentation, and decision-making, highlights that educators face significant challenges in leading the teaching-learning process, while students show a lack of cognitive tools that enable them to develop critical reading skills.
12	Cosi & Zeballos (2024)	Critical thinking is a fundamental pillar that allows students, regardless of their educational level, to draw their own conclusions from the analysis of the information they receive, confronting it with their knowledge and personal criteria.

13	Andreucci et al. (2023)	Conceptual critical thinking is related to both dispositions and skills, and while there is no consensus on its definition, it is established as a higher-order cognitive process that can be trained.
14	Khairuddin et al. (2024)	Students perceive their critical thinking skills as adequate, which is linked to their appropriate level of academic writing; this implies that educators need to integrate both skills during the teaching and learning processes.
15	Golden (2023)	Another factor that significantly influences the development of critical thinking is planning, which must include prerequisites for learning that ensure adequate attention to the impact of the educational environment. In this regard, it is essential to consider four key elements in the lesson structure that support the strengthening of students' critical thinking. Furthermore, it is necessary to maintain a clear awareness of the multiple outcomes that active participation in critical thinking can generate in the educational process.
16	Elera et al. (2023)	Critical thinking can be addressed from various curricular areas. This requires educators who are critical thinkers, well-trained, skilled, and proficient in their respective disciplines, supported by a flexible curriculum that includes content and spaces that promote its strengthening.
17	Pedraja & Rodríguez (2023)	To foster critical thinking, it is essential to implement methodologies such as flipped classrooms, problem-based learning, project-based learning, the use of technology, and cooperative work.
18	Novoa & Sandoval (2023)	Various educational strategies, such as inquiry-based learning, problem-based learning, case-based learning, and project-based learning, have been widely identified in the academic literature as effective methods for fostering critical thinking. Among them, problem-based learning, inquiry-based learning, case analysis, and project-based learning stand out. These methodologies are fundamental as they allow students to more robustly develop their capacity to process information, make value judgments, and enhance their critical thinking—essential skills for providing effective solutions to the challenges they face.
19	Callohuanca (2021)	Reading with a critical-reflective focus enhances critical thinking in students, as it provides them with the opportunity to examine and evaluate authors' ideas, question presented viewpoints, and make informed decisions on significant issues.
20	Medina (2022)	Metacognitive strategies have a significant impact on the development of students' critical thinking.
21	Martos et al. (2022)	Educational strategies should be designed to facilitate students' effective resolution of real problems. This is because concrete and abstract elements integrate into the process of reconstructing critical thinking.
22	Flores & Neyra (2021)	Reading involves a reflective process in which the aim is to understand the content and find personal and relevant meaning in life. This constructive process can be strengthened through various strategies, such as writing academic and philosophical essays, as well as actively participating in debates on diverse topics.

23	Cangalaya (2020)	In the university context, it is recognized that argumentation, analysis, problem-solving, and evaluation are essential competencies for fostering critical thinking, always with the support of educators, whose involvement is crucial for motivating students.
24	Cruz & Hernández (2021)	The use of technology in education faces challenges related to the digital divide, fundamentals, access, and resources; however, it has great potential to transform the educational system. Therefore, it is essential to provide support and empower educational process actors through innovative tools, thus promoting a departure from traditional teaching and learning methods.
25	Evendi et al. (2022)	The implementation of a problem-based e-learning model enhances critical thinking.

Importance of critical thinking in students

The results demonstrate that critical thinking manifests in students' ability to analyze and understand various perspectives of knowledge. This involves the skill to evaluate different positions and arguments, including those that challenge their own beliefs. Critical thinking is a fundamental competency for university students, as it enhances the quality and relevance of their academic work. Additionally, it fosters the formulation of relevant questions, the evaluation of arguments, reflection on their own research processes, and the incorporation of multiple viewpoints, enriching academic production across various fields of knowledge (Tasayco et al., 2024).

Furthermore, the development of critical thinking contributes to building a more reflective and engaged society in social, ethical, and environmental domains (Vendrel, 2023). In this sense, ensuring its development is essential for shaping students' professional and educational growth, promoting better quality learning, greater assimilation of educational material, and effective application of knowledge in practical contexts (Hutsalo et al., 2024). Therefore, critical thinking should be a key capability that students acquire from the early stages of their education (Saavedra, 2024).

Individuals can employ critical thinking skills to organize information, including facts, to identify and solve problems (Sharma et al., 2022). Thus, there has been a demonstrated improvement in the perception of achievement regarding complex thinking competence and its sub-competencies among students, with critical thinking achieving the best results related to overall well-being (Vázquez et al., 2023). Consequently, critical thinking is an essential capability for forming students with a reflective and analytical attitude, especially required in secondary education to face the challenges of a constantly changing context (Quispe, 2025).

It is imperative to advance toward an ethical, strategic, participatory, and interactive education, in which critical thinking is valued as an intrinsic formative competency of every individual, promoting its development and management. To this end, it is essential to design an axiomatic model of managerial education oriented toward continuous professional training (Deroncele et al., 2020).

Critical thinking plays a crucial role in improving students' problem-solving capabilities, particularly in higher education, where they are expected to address complex real-world issues. In this context, fostering critical thinking is suggested to not only improve academic performance but also equip students with essential skills for professional success (Prakong, 2024). Indeed, critical thinking in university students is indispensable and constitutes a key requirement for decision-making and problem-solving. Moreover, it is fundamental to implement cross-disciplinary academic programs that enhance creative thinking, especially in business-related fields (López et al., 2022).

Finally, critical thinking, composed of subcategories such as reasoning, argumentation, and decision-making, reveals that educators face significant challenges in leading the teaching-learning process, while students demonstrate a lack of cognitive tools that enable them to develop critical reading skills (Núñez et al., 2020).

Factors associated with critical thinking

Critical thinking constitutes a fundamental pillar that allows students, regardless of their educational level, to draw their own conclusions from the analysis of the information received, confronting it with their knowledge and personal criteria (Cosi & Zeballos, 2024). This concept is linked to both dispositions and cognitive skills; although there is no absolute consensus on its definition, it is recognized as a higher-order cognitive process that can be trained. On the other hand, results indicate that the immersion approach has been widely employed, and

certain instructional strategies have demonstrated greater effectiveness in developing critical thinking (Andreucci et al., 2023).

Moreover, students perceive their critical thinking skills as adequate, which is directly related to satisfactory performance in academic writing. This implies that educators should integrate both competencies during teaching and learning processes to enhance their joint development (Khairuddin et al., 2024).

Another determining factor in fostering critical thinking is educational planning, which must include prerequisites for learning necessary to ensure adequate attention to the impact of the educational environment. In this regard, it is essential to consider four key elements in the lesson structure that support the development of critical thinking in students, as well as to maintain a clear awareness of the multiple outcomes generated by active participation in this process (Golden, 2023).

Critical thinking can be addressed from various curricular areas, provided that educators are also critical thinkers, well-trained, skilled, and proficient in their respective disciplines. All of this should be supported by a flexible curriculum that includes content and spaces designed to promote the strengthening of this competency (Elera et al., 2023).

Strategies and training actions implemented for the development of critical thinking in students

To foster critical thinking, it is essential to implement methodologies such as flipped classrooms, problem-based learning, project-based learning, the use of technology, and cooperative work (Pedraja & Rodríguez, 2023). The academic literature highlights various learning strategies, such as inquiry-based learning, problem-based learning, case-based learning, and project-based learning. These methodologies are relevant because they enable students to develop their capacities to process information, make value judgments, and strengthen their critical thinking, thereby facilitating the generation of solutions to complex issues. Consequently, the indicators of critical thinking are met for higher levels of education (Novoa & Sandoval, 2023).

On another note, reading with a critical-reflective approach enhances students' critical thinking, as it provides them with the opportunity to examine and evaluate the authors' arguments, question different viewpoints, and make informed decisions on significant topics (Callohuanca, 2021). Additionally, metacognitive strategies have a significant impact on improving these skills (Medina, 2022).

In this regard, educational strategies should be designed to facilitate students' effective resolution of real problems, integrating concrete and abstract elements in the processes of reconstructing critical thinking (Martos et al., 2022). Since reading involves reflecting on content and finding personal meaning, it is a constructive process that can be strengthened through the writing of academic and philosophical essays, as well as participation in debates on various topics (Flores & Neyra, 2021).

In this way, the necessary capacities to foster critical thinking in students are developed, considering skills such as argumentation, analysis, problem-solving, and evaluation. In the university context, these competencies are recognized as essential for promoting critical thinking, always with the support of educators, whose involvement is key to motivating students. The most effective way to materialize this type of thinking in the classroom is through research reports that promote students' reflection in their own contexts. The development of critical thinking, guided by well-defined criteria, facilitates a direct connection to meaningful learning (Cangalaya, 2020).

On the other hand, the use of technology in education faces challenges related to the digital divide, fundamentals, access, and resources; however, it has great potential to transform the educational system. Therefore, it is essential to provide support and empower educational process actors with innovative tools, promoting a departure from traditional teaching and learning methods (Cruz & Hernández, 2021). In this framework, the implementation of a problem-based e-learning model has proven to enhance critical thinking (Evendi et al., 2022).

Conclusions

Critical thinking manifests in students' ability to analyze and understand various perspectives of knowledge, as well as to evaluate different positions and arguments, including those that challenge their own beliefs. Its development contributes to the formation of a more reflective and engaged society in social, ethical, and environmental domains. Factors influencing the strengthening of critical thinking include the immersion approach, academic writing, planning that considers prerequisites for learning, and the presence of educators who are critical thinkers, well-trained, skilled, and proficient in their respective disciplines, supported by a flexible curriculum.

Furthermore, strategies that favor critical thinking include the implementation of methodologies such as flipped classrooms, problem-based learning, project-based learning, the use of technology, and cooperative work. Inquiry-based learning, critical-reflective reading, metacognitive strategies, the writing of academic and philosophical essays, and participation in debates on various topics are also fundamental. Additionally, skills such as argumentation, analysis, problem-solving, and evaluation are key to enhancing this type of thinking. Finally, it is essential to empower educational process actors through innovative tools and promote a departure from traditional teaching and learning methods.

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