




Critical thinking in education: a systematic review

El pensamiento crítico en el ámbito educativo: una revisión sistemática

Pensamento crítico em educação: uma revisão sistemática

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PALABRAS CLAVE

enseñanza, habilidades, pensamiento crítico, prácticas docentes

ABSTRACT. The purpose of the study was to identify and analyze the contributions made to the development of critical thinking in the educational field. Therefore, the examination corresponds to a systematic review design of basic research. The information was collected using the bibliographic and systematic search of documents in different reliable databases. Twenty articles were selected. From the documentary review, it has been determined that the most prevalent investigations have been quantitative, descriptive, qualitative, and mixed. It was found that the development of critical thinking is essential to becoming a whole person. This implies that the subject can define or fully understand a situation or problem that guides him towards its solution. In this context, as a critical thinker, a student must develop specific capacities that are constantly stimulated so that they can be sufficiently enhanced to become an actual skill.

RESUMEN. El propósito del estudio fue identificar y analizar los aportes realizados para el desarrollo del pensamiento crítico en el ámbito educativo. El estudio corresponde a una investigación básica, con un diseño de investigación de revisión sistemática. La recolección de información se realizó mediante la búsqueda bibliográfica y sistemática de documentos, en diferentes bases de datos confiables. Fueron seleccionados 20 artículos. A partir la revisión documental se ha determinado que las investigaciones que más predominan han sido las cuantitativas, descriptivas, cualitativas y mixtas. Se encontró que el desarrollo del pensamiento crítico, es esencial para convertirse en una persona integral. Esto implica que el sujeto pueda definir o entender completamente una situación o problema que lo encamine hacia su solución. En este contexto, un estudiante, como pensador

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crítico, debe desarrollar capacidades específicas estimuladas constantemente, de tal manera que se puedan potenciar lo suficiente hasta convertirse en una verdadera habilidad.

PALAVRAS-CHAVE

ensino, habilidades,
pensamento crítico,
práticas de ensino

RESUMO. O objetivo do estudo foi identificar e analisar as contribuições feitas para o desenvolvimento do pensamento crítico no campo educacional. O estudo corresponde a uma pesquisa básica, com desenho de pesquisa de revisão sistemática. A coleta de informações foi realizada por meio de busca bibliográfica e sistemática de documentos, em diferentes bases de dados confiáveis. 20 artigos foram selecionados. A partir da revisão documental, determinou-se que as investigações mais prevalentes foram quantitativas, descritivas, qualitativas e mistas. Verificou-se que o desenvolvimento do pensamento crítico é essencial para se tornar uma pessoa completa. Isso implica que o sujeito pode definir ou compreender plenamente uma situação ou problema que o orienta para sua solução. Nesse contexto, o aluno, como pensador crítico, deve desenvolver capacidades específicas que sejam constantemente estimuladas, de forma que possam ser suficientemente aprimoradas para se tornarem uma verdadeira habilidade.

1. INTRODUCTION

For decades, educational policies have been based on rote teaching at all academic levels. This is the most straightforward action that has been used for many years disguised under traditional learning, which consists simply of accumulating information. Currently, teaching has evolved through pedagogical practice, turning from rote learning to meaningful learning, an educational challenge of the 21st century. As a result of the age of knowledge, a new sense of teaching was implanted that encourages critical thinking. This allows students to express opinions, adapt to reality, promote innovation and problem solving, thus achieving their highest academic level (Rivadeneira et al., 2019).

In this regard, Sanz and Serrano (2017) point out that education in all educational systems aims to develop the capacities that the person possesses. Thus, through the curricular programs, pedagogical activities are launched that contribute to language development, thought, reflection, creativity, autonomy, entrepreneurship, and other human faculties. According to Núñez et al. (2020) human capacities integrate knowledge, affection, socialization, and life principles. These aspects are achieved procedurally. If it is oriented from the family, society, and education, there will be students capable of performing in different contexts than those in which it operates.

In the international arena, specifically in Spain, Menárguez (2021) discusses the poor results of Spaniards obtained in the latest report from the international program for Student Assessment (PISA). The Ministry of Education specifies that the objectives of the new curriculum, whose implementation is planned for the academic year 2022-2023 and which will be approved through a royal decree, go precisely in that direction, thinning the content so that students memorize less and develop another kind of higher-order skills like critical thinking. In addition, the executive aims to design a shorter, less comprehensive, more flexible, and more focused curriculum on basic skills and essential learning, with more straightforward assessment tools. This will help prepare the student for a world that changes very quickly and in which people must continue to learn throughout their lives.



Likewise, in the absence of concrete initiatives on the administration so that schoolchildren learn to identify false information on the Internet and make a critical consumption of content, private projects are emerging that are landing in Spanish educational centers. In a coincidence, Chrobak (2017) adds that the moment that includes teaching and learning must be understood as the foundation for the person's integral formation. Its development for continuous learning is highlighted, and higher-order capacities are favored, such as critical thinking. Thus, in a class, it must be ensured that everyone learns to observe, analyze, interpret, express an opinion or argue their positions within the framework of theoretical bases. This educational purpose must be assumed at all academic levels, and better still, during primary education, as well as it must be transversal in all curricular lines.

Regarding the Latin American context, Tabares et al. (2019) state that one of the demands of Chilean higher education consists of constructing training and evaluation proposals that allow young people to develop and strengthen their critical thinking. Likewise, it affirms that it is essential that the institutions lead their training activities. It is necessary to prioritize students' learning process and involve the teacher within it. Hence, the development of critical thinking constitutes a channel that makes it possible to fulfill this objective. This favors comprehensive training and educational practices according to the demand to train vital and participatory citizens.

Verástegui et al. (2018) state that this seems to be a new topic in the Peruvian context. Human action leads us to see that as a society; it has not yet developed with responsibility and autonomy; therefore, in the Peruvian educational system, the competency approach, among the different aspects of the student's development, pays attention to the achievement of reasoning, creativity, and critical thinking. Consequently, Arias (2018, citado por Mackay et al., 2018) states that this type of thinking favors inductive or deductive reasoning based on proposed premises or reality. Reflection, even when it is a human faculty, is learned in life with methods, strategies, or materials that avoid the only theoretical orientation.

However, in the educational context, one concerns the little reflection on the different events that one experiences, which projects the image of a human group with little initiative to transform their reality.

Faced with the ideas spilled, educational institutions must pay attention to developing cognitive processes that favor the ability to reason. Students must propose solutions to various facts or issues that require resolution. To do this, you need to use strategies that lead you to make deductions or conjectures that then allow you to reach conclusions and proposals based on reason.

It is relevant to highlight the importance of critical thinking and its link to educational processes. Both students and teachers must work together on mechanisms that promote understanding and applying knowledge in

different settings. The situation enables the reorganization, restructuring of information and, therefore, assigning meaning to what is thought, felt, or done. Based on the above, we will seek to know how critical thinking in the educational field is approached today?

To answer the question posed, the objective is to identify and analyze the contributions made to developing critical thinking in the educational field.

2. METHOD

2.1 Study design

The study was of a primary type, and the research was aimed at systematically obtaining new knowledge, with the sole objective of increasing the understanding of a specific reality (Álvarez, 2020). Therefore, the systematic review study design consists of a clear and structured summary of the available information to answer a clinical question. Furthermore, since the proposed method comprises multiple articles and sources of information, they represent the highest level of evidence.

Systematic reviews are characterized by having and describing a transparent, understandable development process to collect, select, critically evaluate and summarize all the available evidence regarding a particular topic. They facilitate and translate the contents of multiple articles that respond to the same issue (Moreno et al., 2018).

2.2 Data collection procedure

The bibliographic and systematic search of documents was carried out; for this purpose, scientific articles selected in the Ebsco and Scielo search engines were established as the unit of analysis, ordered in an Excel matrix to facilitate their rapid location.

The search and selection of the articles began in 2017 to 2021. How the passage of the pieces proceeded they followed an organized structure. In the first place, the papers were chosen based on the review of the title, the abstract, and the words used to search for them. Next, whether they were consistent with the established inclusion criteria was verified.

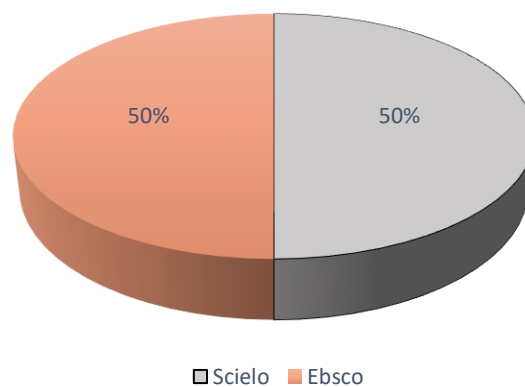
The words used for the search were: “critical thinking” “critical thinking in education”, which were placed according to the language. First, the results were filtered according to the period. Second, we read the selected articles, which met the inclusion criteria. Finally, forty-five full-text articles were obtained and estimated to analyze their eligibility.

Regarding the inclusion and exclusion criteria, it was taken into consideration that the articles are from indexed journals, complete, contain most of the keywords, and contribute to the study. While, among the exclusion

criteria, it can be mentioned that the articles that were not taken into account are those that were incomplete, that did not contain information appropriate to the topic, that did not belong to indexed journals, that were outside the period search and whose contribution was not relevant to the study. As a result of the above, 20 articles were selected.

In the following figure, it is possible to see that the articles are divided between the Ebsco search engine, which represents 50% of the information found. Scielo articles represent the other 50% of the articles that will be useful for research.

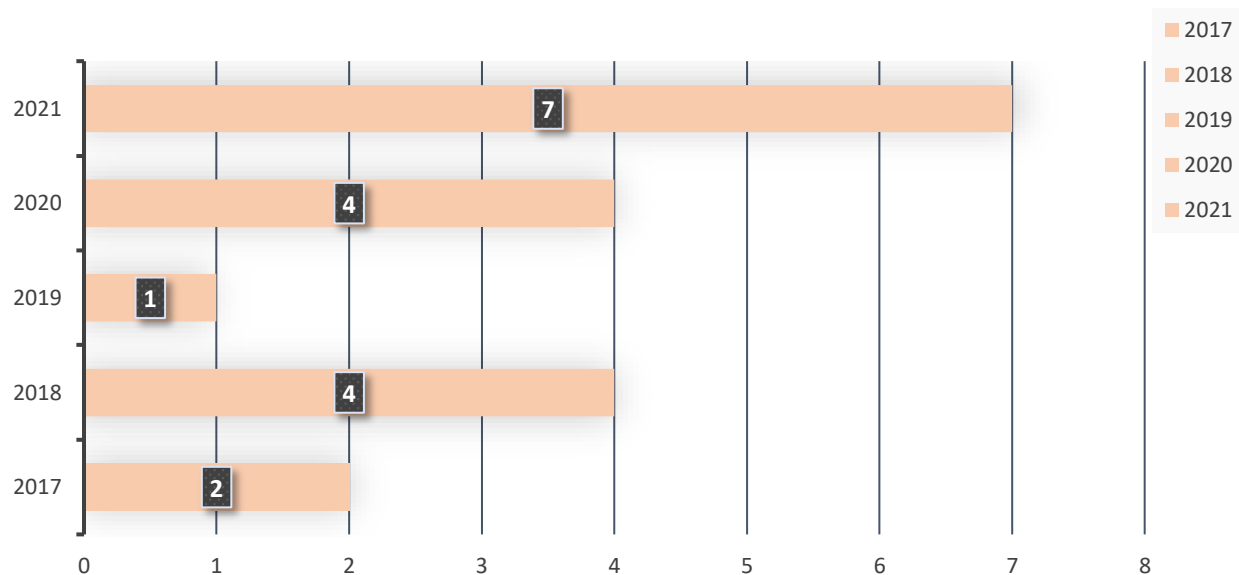
Figure 1: Percentage of articles selected according to search engine



Note. Elaboration based on searches carried out in Scielo and Ebsco.

Half of the information is obtained from Ebsco, which is due to the wide variety of articles on the same topic. Added to this is the supply of other documents, more than just scientific articles. This gives it a more significant advantage over the rest of the search engines consulted.

Figure 2 shows the distribution of the 20 articles found in both databases according to their year of publication. For 2017, 2 articles were selected. In 2018, 4 pieces were chosen. For the year 2019, only 1 article was selected. From the year 2020, there are four articles, and from the year 2021, a total of 7 articles.

Figure 2: Search results for articles according to year of publication

Note. Own elaboration based on database search

2.3 Analysis technique

Data collection consists of collecting information to analyze and understand them through various techniques such as observation, interviews, or documents (Hernández et al., 2014). In the present study, data collection sheets from scientific articles were used as an instrument, which allowed the registration of the research database.

The data collection sheet of the documents found contains the following data: reference, objective summary, type/design of research, keywords, statistical techniques used, and study contributions.

Scientific articles containing information about critical thinking were compiled. The primary data were extracted for identification (authors, year, journal). As well as the main contributions, results, and conclusions to which they arrived.

3. RESULTS

Regarding the variable under study, Núñez et al. (2020) state that, in the face of avant-garde ideas, educational institutions need to develop cognitive processes that promote reasoning skills so that students find solutions to

a variety of facts or problems that need to be solved. To do this, you need to use strategies that lead you to make deductions or conjectures that then allow you to reach conclusions and proposals based on reason.

It can be said that most of the articles are from the last five years and consequently contain very recent information on the subject analyzed. Therefore, its verification was beneficial in the development of the research.

It also shows a more fantastic approach to the issue in this regard.

Ossa et al. (2017) state that critical thinking is a very complex construct, defined from very diverse theoretical frameworks due to instruments of different nature. In this way, the idea of making essential skills of thinking visible in a more integrated way arises. That is, consider cognitive and metacognitive skills as the basis and, on the other hand, the possibility of generating self-regulation and motivation to achieve a critical disposition, which implies being open to multiple approaches to make decisions and intervene in social reality.

Table 1

Authors of articles by country of publication

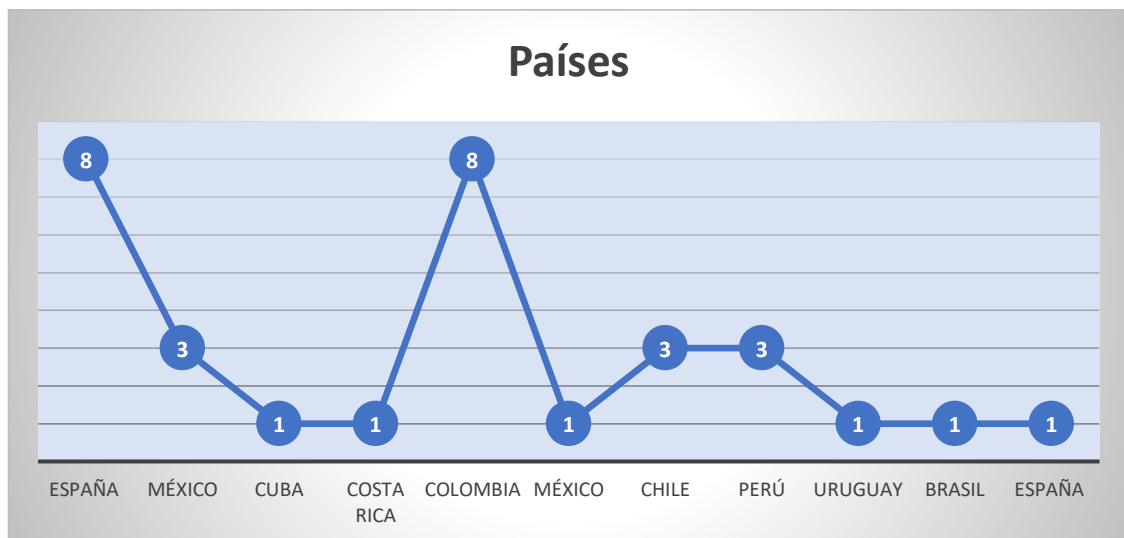
N°	Author	Country
1	Núñez et al. (2020)	Colombia
2	Gómez y De la Herrán (2018)	Spain
3	Tabares et al. (2019)	Colombia
4	López et al. (2020)	Peru
5	Cobos et al. (2021)	Colombia
6	Mindiola y Castro (2021)	Colombia
7	C. López et al. (2021)	Peru
8	Pérez et al. (2021)	Costa rica
9	Madrid (2018)	Colombia
10	Rivadeneira et al. (2019)	Colombia
11	Morales y Díaz (2021)	México
12	Ramada et al. (2021)	Colombia
13	Palma et al. (2021)	Chile
14	Cangalaya (2020)	Peru
15	Mena (2020)	Chile

16	Ossa et al. (2017)	Uruguay
17	Mackay et al. (2018)	Cuba
18	Quintero et al. (2017)	Brasil
19	Salazar y Ospina (2019)	Colombia
20	Prieto (2018)	Chile

Note. Own elaboration based on database search

In the table presented, it can be seen that Latin America contributes a more significant number of articles; the number of authors per article is also appreciable. This makes it possible to identify a similar proportion between those with a single author and those articles with two or three authors.

Figure 3: Distribution of articles by country of publication



Note. Own elaboration based on database search

In figure 3, it can be seen that, of the 20 articles selected according to the country of publication, eight are from Colombia, three from Chile, and three from Peru. While in Costa Rica, Spain, Mexico, Uruguay, Cuba, and Brazil, only 1 article was selected.

Cobos et al. (2021) highlight the importance of implementing strategies. They consider that to strengthen the development of critical thinking in students, discussions, and interaction in class should be used. Consequently, Tabares et al. (2019) affirm that there is also strong argumentation, which contributes to constructing positive and negative arguments against a controversial idea.

Morales and Díaz (2021) add that these strategies and the critical thinking approach from the case methodology have been shown that they facilitate and promote active learning and help solve problems. In addition, they encourage critical thinking, provide the possibility of inquiring about situations, as well as about the dilemmas posed.

Next, the relation of the titles of the articles with the contribution to the investigation is presented, the same one related to critical thinking. This is relevant because it allows more excellent theoretical support for comparing the results obtained.

Table 2

Title and contribution of the analyzed articles regarding virtual education and digital gaps

N°	Article title	Author	Contribution to the study
1	Didactic strategies in the development of critical thinking in primary education students	Núñez (2020)	et al. Faced with avant-garde ideas, educational institutions need to develop cognitive processes that promote reasoning skills so that students find solutions to various facts or problems that need to be solved. To do this, you need to use strategies that lead you to make deductions or conjectures that then allow you to reach conclusions and proposals based on reason.
2	We are developing critical thinking in secondary education students: design, application, and evaluation of an educational program.	Albertos y& De la Herrán (2018)	Although some programs for the development of critical thinking have been carried out in the university environment, in secondary education, the situation is much more worrying; its presence, as an explicit skill, is practically nil in the classroom. Faced with this situation, the gradual implementation of specific educational programs for critical thinking among students is necessary.
3	Intervention program in critical debate on critical thinking in university students.	Tabares (2019)	et al. The study analyzed the impact of an intervention program based on the critical debate on the critical thinking of undergraduate psychology students. Regarding the effect of the intervention program, it increased and greatly improved the essential review of the students. Critical argumentation contributes to constructing positive and negative arguments against a controversial idea, involving the individual in a process that leads him to reformulate his thinking.

4	University Pedagogy Based on Generic Competencies to Develop Critical Thinking Skills in Students of the National University of San Martín.	I. López et al. (2020)	It expresses the importance of critical thinking skills, essential to becoming a whole person. While many educators recognize the need to help their students develop these skills, many teachers feel they did not have enough time to dedicate themselves to this goal; others acknowledge that they could not think effectively and therefore did not. Yet, they felt at the height of meeting this challenge.
5	Oral argumentation for the development of critical thinking in the classroom	Cobos et al. (2021)	The key strategies for strengthening critical thinking development in seniors are class discussion and interaction. These occur naturally and are carried out by the students. They express their points of view regarding a specific topic, a question, or a text, generally given by the teacher, but where the students also compare, share and discuss their ideas with those of their peers.
6	Development of critical thinking through asynchronous discussion forums with 8th- grade students	Mindiola y Castro, (2021)	The analysis of the information made it possible to demonstrate the participation of the students as a relevant element in the sensitization process, giving rise to the role of moderator for the teacher. Involving students from the design phase of mediation is favorable for developing critical thinking skills. It stimulates the development of potentialities, corrects poor cognitive functions, and leads students to learn in their potential zone. In addition, it develops the capacity to think, feel, create, innovate, discover and transform its environment.
7	Critical thinking in higher education students: a systematic review.	C. López et al. (2021)	One of the most exciting challenges for teachers, in this new era of science and technology, is to teach students to think, on their own, without taking into account their curricular experience or their chosen profession; the responsibility is that the student manages enough tools to solve problem situations by themselves, encouraging critical thinking in them.
8	Diagnosis of critical thinking in elementary school students from Chimbote, Peru.	Pérez et al. (2021)	The study indicates a deficit of critical thinking in the student body, which highlights educational interventions based on the use of active learning strategies applicable from pedagogical practice in educational institutions. In addition, it is perceived that current education remains the same despite the time. Therefore, the results demonstrate the need to implement educational programs applicable to the National Education Curriculum.

9	Development of critical thinking from Social Sciences in primary, secondary education.	Madrid (2018)	The study reflects on the kind of training that the Social Sciences teacher should have, that to understand the socioeconomic and cultural reality that inhabits, value cultural, popular, and local knowledge, in short, understand social phenomena from thought Critically, an educator is necessary whose training encourages the intellectual development of the student, and precisely this will not be achieved if the attitude of continuing to do things, in the same way, year after year persists.
10	Strengthening critical thinking in higher education	Rivadeneira et al. (2019)	An interesting starting point would be for universities to include studies on critical thinking in their lines of research. These studies could diagnose the fundamental level of review of their students and the community members (link with the community) to which they belong.
11	Critical thinking through a teaching case: an investigation of educational design	Morales y Díaz (2021)	About the critical thinking approach from the case methodology, it has been shown that these facilitate and promote active learning, help solve problems, encourage critical thinking, and provide the possibility of inquiring about situations and issues. Dilemmas raised; Likewise, they stimulate analysis by demanding from the student's projections of their actions in the face of circumstances such as those described above and preparing for decision-making and positions.
12	Disposition towards critical thinking, academic level, gender, and problem-solving in secondary education.	Ramada et al., (2021)	Improving performance in problem-solving continues to be a central goal of math and science teachers and math and science didactics researchers. To achieve this objective, they proposed that problem-solving skills had to be developed in specific activities in the classroom and that it was necessary to know and address the students' difficulties during the resolution.
13	Adaptation and validation of the Critical Thinking Tasks test in university students.	Palma et al. (2021)	This article contributes that the Critical Thinking Tasks (TPC) instrument is reliable; it is based on the idea that the discipline influences the development of critical thinking; In short, it is a priority to strengthen specific skills such as inquiry, analysis and communication, and to improve this skill.
14	Critical thinking skills in university students through research.	Cangalaya (2020)	At present, it is essential to know about the skills that intervene in critical thinking. For example, the subject can define or fully understand a situation or problem that guides him towards its solution. In this context, as a critical thinker, a student must



			develop specific capacities that are constantly stimulated so that they can be sufficiently enhanced to become an actual skill.
15	A taxonomy of educational media for the development of critical thinking: Action domains and textual typologies.	Mena (2020)	In this sense, when promoting critical thinking through educational means, whether in school education or permanent education, it is recommended to resort to a coordinated use of different standards. Each of them complies a substantial role in addressing specific components of critical thinking while complementing the others.
16	Analysis of instruments for measuring critical thinking.	Ossa et al. (2017)	Critical thinking is a very complex construct, defined from very diverse theoretical frameworks, as a result of instruments of different nature; in this way, the idea arises of making critical thinking visible in a more integrated way. That is, consider cognitive and metacognitive skills as a basis and, on the other hand, the possibility of generating self-regulation and motivation to achieve a critical disposition, which implies being open to focus.
17	Critical thinking applied to research.	Mackay et al. (2018)	Its contribution lies in the fact that it indicates that logic, built or resolved through abstract and critical thoughts, makes people gain more excellent knowledge and their necessary decision level is more precise, whenever thoughts, previous experiences, the ability to reason in simulated problems, the order and clarity that the mind has gained through the practice of critical thinking processes.
18	"Development of critical thinking through the application of Problem-Based Learning"	Quintero et al. (2017)	The study contributes that the educational system requires a new comprehensive and prospective model that guides the action of teachers and students towards obvious pre-established ends. In this way, it states that Problem-Based Learning is a teaching strategy that promotes generic competencies and capacities for forming and developing critical thinking. In this sense, critical thinking allows future professionals, within their work context, to make informed decisions for effective and efficient results.
19	Critical thinking level of first and last-semester nursing undergraduate students from a university in	Salazar y Ospina (2019)	Being aware of the importance of critical thinking, it is now necessary to move towards action by implementing strategies beyond the inclusion of competencies in curricula or training profiles. Didactic pedagogies and institutional policies should be proposed intended to promote critical thinking, accompanied by objective measurements of the levels of



Medellín, Colombia.	critical thinking and its domains, with validated and reliable instruments that demonstrate the achievement of the objective.
20 Critical thinking and self-knowledge	Prieto (2018) To assume that the epistemological dimension is the most important in terms of critical thinking, that is, the evaluation of the reasons that support it would mean that human beings can effectively control their entire 'nature' through reason, control their emotions, feelings, body, etc., and even the conditions of the environment in which it is found, the socio-cultural context.

Note. own elaboration based on search carried out.

The contributions of the studies compiled according to Pérez et al. (2021) point out a deficit of critical thinking in the student body, which highlights educational interventions based on the use of active learning strategies, applicable from pedagogical practice in educational institutions. In addition, it is perceived that current education remains the same despite the time. Therefore, the results demonstrate the need to implement educational programs applicable to the National Education Curriculum.

4. DISCUSSION

The studies reviewed agree that it is necessary to know about the skills involved in critical thinking so that the subject can fully define or understand a situation or problem that leads to its solution. In this context, it can be affirmed that a student, as a critical thinker, must develop specific capacities that are constantly stimulated in such a way that they can be sufficiently enhanced to become an actual skill.

highlight the importance of critical thinking skills, which are essential to becoming a well-rounded person. One of the most latent challenges for teachers in this new era is teaching students to think critically, regardless of their curricular experience or chosen profession. Students are required to handle enough tools to solve problem situations independently, which encourages critical thinking in them. While many educators recognize the need to help students develop these skills, they feel they did not have enough time to dedicate to this goal. Others acknowledge that they could not think effectively and therefore did not feel up to meeting this challenge.

Likewise, Gómez and De la Herrán (2018) point out that, although some programs for the development of critical thinking have been carried out in the university environment, in secondary education, the situation is much more worrying, its presence, as an explicit ability, is practically nil in classrooms. Faced with this situation, implementing specific educational programs for critical thinking among the student is essential. Likewise, Madrid (2018) adds that an educator must promote the student's intellectual development, which will not materialize if the attitude of continuing to do things, in the same way, year after year, persists.



For their part, Quintero et al. (2017) emphasize that the education system needs a new comprehensive and forward-thinking model to guide teachers and students towards obvious established goals. In this way, he points out that among the strategies to develop critical thinking in problem-based learning (PBL). This is a teaching strategy that promotes both the training and the development of general necessary thinking skills and competencies.

Mindiola and Castro (2021) emphasized that student participation is relevant in the awareness-raising process. This shows that involving students from the design stage of mediation is conducive to the development of critical thinking skills because it stimulates the growth of potential, corrects the lack of cognitive function, and guides students to learn in their potential areas. . In addition, it also cultivates the ability to think, feel, create, innovate, discover and transform the environment.

Among the limitations found, it can be considered that the learning strategies that allow the development of critical thinking are little applied in educational institutions. Educational curricula continue to perceive education as in ancient times. The situation limits the incorporation of critical thinking in students' teaching and learning processes.

Finally, being aware of the importance of critical thinking, it is necessary to implement strategies. The pedagogy of compulsory thinking education and institutional policies should be proposed and promoted, objectively measuring the level of critical thinking and its field. It is essential to use proven and reliable tools to demonstrate the achievement of the goals. In this sense, it is recommended to promote critical thinking through educational means, whether in primary or higher education.

5. CONCLUSIONS

One of the most relevant challenges teachers face in this new technological era is teaching students to think independently. This will allow them to handle enough tools to solve problems alone. Teaching must be student-centered, and supporting independent learning requires teachers to use various teaching strategies to stimulate the development of critical thinking. That is, identify, analyze, evaluate, classify and explain what they learn.

However, according to what has been analyzed, the development of critical thinking today still finds many shortcomings both in students when imparting their thinking in a reasoned way and teachers when approaching strategies that help develop this ability. A reality that persists at all educational levels is why it is considered a priority to be installed in secondary and higher education. Its development would allow the change in the quality of education; the idea is to put into practice a series of cognitive and procedural skills that will enable the construction, communication, and evaluation of scientific knowledge.

Likewise, education today requires knowing about the skills involved in critical thinking, which will allow the student to establish himself within a context that motivates him to think and make essential thinking visible in a more integrated way. That is, consider both cognitive and metacognitive skills as a basis and, on the other hand, the possibility of generating self-regulation and motivation to achieve a critical disposition that allows being open to multiple approaches to make decisions and intervene in social reality.

Therefore, it is recommended to give continuity to other studies, which allow the subject under investigation to be controlled with innovative programs and activities that promote critical thinking development. In addition, it is essential to take into account the style and pace of student learning to improve educational quality.

It is suggested to promote the teaching style where skills such as interpreting, analyzing, evaluating, and arguing their theoretical positions are encouraged. Promote spaces and activities that allow reflection and analysis of thought. In addition, the student's environment must be informed, sensitized, and involved in the development and stimulation of these skills as they are valuable tools in life, both academically and personally.

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Cleyssen Benavides: conceptualización, curación de datos, análisis formal, adquisición de fondos, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & edición.

Aurelio Ruíz: conceptualización, análisis formal, investigación, metodología, administración del proyecto, recursos, software, supervisión, validación, visualización, escritura - preparación del borrador original, escritura - revisar & edición.

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