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The Critical Thinking-Metacognitive Pyramid (CTPM) in the teaching-learning process

La Pirámide de Pensamiento Crítico -Metacognitivo (PPCM) en el proceso de enseñanza-aprendizaje

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ABSTRACT

The objective of the research is to generate a proposal on the Pyramid of Critical and Metacognitive Thinking (PPCM) as a pedagogical resource in the teaching-learning process for students at the Madre Laura Educational Institution in the municipality of Tierralta, department of Córdoba, Colombia. Interviews were conducted with key informants, who for this study were 10 teachers. Critical thinking is a fundamental skill in the educational process, as it allows students to analyse, reflect and make decisions in a conscious and informed manner. In this sense, the Pyramid of Critical-Metacognitive Thinking (PPCM) is presented as a pedagogical tool that facilitates learning by organising and structuring ideas in a clear and understandable way. This strategy helps students to identify concepts, establish cause and effect relationships, analyse problems from different perspectives (social, political, economic, environmental, among others) and propose creative and viable solutions.
Descriptors: critical thinking; problem solving; activity learning. (Source: UNESCO Thesaurus).

RESUMEN

Se tiene por objetivo de investigación generar una propuesta sobre la Pirámide de Pensamiento Crítico -Metacognitivo (PPCM) como un recurso pedagógico en el proceso de enseñanza-aprendizaje en los estudiantes de la Institución Educativa Madre Laura en el Municipio de Tierralta, departamento de Córdoba, Colombia. Se realizaron entrevistas a los informantes clave, que para este estudio fueron 10 docentes. El pensamiento crítico es una habilidad fundamental en el proceso educativo, por cuanto permite a los estudiantes analizar, reflexionar y tomar decisiones de manera consciente y fundamentada. En este sentido, la Pirámide de Pensamiento Crítico-Metacognitivo (PPCM) se presenta como una herramienta pedagógica que facilita el aprendizaje al organizar y estructurar las ideas de forma clara y comprensible. Esta estrategia ayuda a los estudiantes a identificar conceptos, establecer relaciones de causa y efecto, analizar problemáticas desde diferentes perspectivas (social, política, económica, ambiental, entre otras) y proponer soluciones creativas y viables.
Descriptores: pensamiento crítico; resolución de problemas; aprendizaje activo. (Fuente: Tesauro UNESCO).

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Research articles section

INTRODUCTION

The Pyramid of Critical-Metacognitive Thinking (PPCM) is a pedagogical proposal within the framework of contemporary learning theories, oriented towards the development of higher order cognitive competencies. This model seeks to articulate critical thinking and metacognition as fundamental axes for transforming teaching-learning processes in complex educational scenarios, such as that of the Madre Laura Educational Institution in Tierralta, Córdoba, Colombia.

Therefore, from a pedagogical perspective, critical thinking is conceived as a transversal skill that allows students to analyse, interpret, evaluate and construct knowledge in a reflective and grounded manner (Bezanilla-Albisua et al., 2018). This process involves not only the acquisition of information, but also the ability to question it, contrast it and apply it to the resolution of real problems. For its part, metacognition, understood as the ability of students to reflect on their own learning processes, is an essential component for self-regulation and autonomy in learning (López-Martínez, 2023). The integration of both dimensions in PPCM allows for a holistic approach to learning, in which students not only develop critical skills, but also become aware of how they learn, which enhances their ability to transfer knowledge to new contexts.

PPCM is based on pedagogical strategies that have been shown to be effective in the literature, such as the use of graphic organisers, problem-based learning (PBL) and the comparison of right and wrong examples (Munayco-Medina, 2018; Duran-Llaro, 2023; Van-Peppen et al., 2021). These strategies not only promote the construction of meaningful learning, but also favour the active interaction of students with the content, fostering situated and contextualised learning. In the case of the Madre Laura Educational Institution, the implementation of the PPCM is adapted to the particularities of the urban context and the socio-cultural characteristics of the students, which guarantees its relevance and pertinence.

Likewise, the PPCM is aligned with the principles of critical pedagogy, which emphasises the importance of forming reflective citizens, capable of actively participating in the transformation of their social reality (Chungandro-Paucar & Franco-Pérez, 2018). In this sense, PPCM not only seeks to improve academic performance, but also to contribute to the integral development of students, promoting values such as autonomy, responsibility and social commitment.

From the above, the research objective is to generate a proposal on the Pyramid of Critical Thinking - Metacognitive (PPCM) as a pedagogical resource in the teaching-learning process in the students of the Madre Laura Educational Institution in the Municipality of Tierralta, Department of Córdoba, Colombia.

Theoretical background

The theoretical referential is based on research that addresses the development of critical thinking, the pedagogical strategies to stimulate it and its impact on the construction of meaningful learning, with emphasis on its integration in diverse educational contexts:

Critical thinking as an educational competence

From a pedagogical perspective, critical thinking is defined as the ability to analyse, evaluate and synthesise information in a reflective, grounded and contextualised manner. This process involves the development of higher-order cognitive skills, such as interpretation, inference, argumentation and evaluation, which are essential for the construction of meaningful learning (Bezanilla-Albisua et al., 2018). In this sense, critical thinking is not limited to the acquisition of knowledge, but fosters the ability to question, transform and apply information in real situations.

Therefore, Ayola-Mendoza & Moscote-Riveira (2018) highlight that critical thinking should be promoted through pedagogical strategies that stimulate active reflection and student participation in their learning process. These strategies include the use of open questions, debates, case analysis and activities that favour argumentation and informed decision-making. In the field of teacher education, these authors stress the importance of educators developing

critical competences to model and guide students in this process, becoming mediators of learning.

Pedagogical strategies for stimulating critical thinking

The development of critical thinking in students requires the implementation of pedagogical strategies that promote reflection, autonomy and the active construction of knowledge. Among these strategies, problem-based learning (PBL) has been promoted as an effective methodology, as it allows students to face real problems, analyse relevant information, generate hypotheses and propose informed solutions (Duran-Llaro, 2023), this methodology encourages not only critical thinking, but also collaboration and self-regulation of learning.

Another outstanding strategy is the use of graphic organisers, which facilitate the structuring and visualisation of critical thinking by allowing students to identify relationships between concepts, prioritise ideas and reflect on their own learning process (López-Martínez, 2023; Munayco-Medina, 2018), these tools not only favour the understanding of complex content, but also enhance metacognition, understood as the ability of students to reflect on how they learn and how they can improve their cognitive processes.

Furthermore, comparing right and wrong examples has been identified as a pedagogical strategy that stimulates critical thinking by engaging students in analysing and evaluating different approaches to solving a problem (Van-Peppen et al., 2021), which fosters active reflection and meaningful learning by enabling students to identify errors, understand their causes and propose alternative solutions.

Impact of critical thinking on meaningful learning

Critical thinking has a direct impact on the construction of meaningful learning by enabling students to relate new knowledge to their previous experiences and apply it in real contexts. According to Chungandro-Paucar & Franco-Pérez (2018), critical thinking not only improves students' problem-solving skills, but also strengthens their understanding of content by promoting deep and contextualised learning.

In the area of reading comprehension, Dewendt (2021) points out that critical thinking facilitates the interpretation and analysis of expository and argumentative texts, which is fundamental for the development of communicative competences. This impact extends to the university environment, where Kumar (2024) and Golden (2023) highlight the importance of integrating critical thinking as a transversal competence in educational programmes, preparing students to face the challenges of professional and social life.

The role of the teacher in the development of critical thinking

Teachers play a central role in promoting critical thinking by acting as mediators and facilitators of learning. In this sense, Bezanilla-Albisua et al. (2018) emphasise that teachers must possess critical competences to design and implement pedagogical strategies that stimulate critical thinking in their students. This implies not only mastery of content, but also the ability to generate a learning environment that encourages reflection, dialogue and active participation.

In specific educational contexts, such as that of the University of La Guajira, Ayola-Mendoza & Moscote-Riveira (2018) indicate the need for teacher training programmes to include the development of critical thinking as a transversal axis. This not only improves pedagogical practice, but also contributes to the comprehensive training of future educators, who will be responsible for fostering these competencies in their students.

Relationship between critical thinking and scientific methods

In this order, Danchin (2023) mentions that critical thinking is an essential component in the development of the scientific method, as it allows students and professionals to question, analyse and validate knowledge in a systematic way, which is not only limited to the evaluation of data, but also encompasses the ability to identify biases, errors and limitations in research processes. From a pedagogical perspective, critical thinking in science fosters a reflective attitude that transcends the mere accumulation of information, promoting the construction of

grounded, ethical and contextualised knowledge. In education, integrating critical thinking from a scientific perspective involves designing activities that stimulate the formulation of questions, problem solving and the evaluation of evidence. This not only strengthens students' analytical skills, but also prepares them to face the challenges of a world where information must be constantly evaluated and reinterpreted.

Analogies and higher-order thinking

In this regard, Richland & Simms (2015) highlight the use of analogies as a fundamental pedagogical tool for developing critical thinking and higher-order skills. Analogies allow students to make connections between previously learned concepts and new knowledge, facilitating the transfer of learning and the resolution of complex problems. This cognitive process, known as analogical reasoning, fosters the ability to identify patterns, relate ideas and generate creative solutions, essential skills in critical thinking. In the educational context, analogy-based activities are especially useful in areas such as mathematics, science and humanities, where students must relate abstract concepts to concrete situations.

Graphic organisers in school contexts

In this context, Ríos-Carrascal (2017) analyses the impact of graphic organisers on the development of critical thinking in rural secondary school students, highlighting their effectiveness in contexts with limited resources. Graphic organisers, such as concept maps, Venn diagrams and hierarchical schemes, allow students to structure and visualise information in a clear and organised way; these tools facilitate the understanding of abstract concepts and promote critical reflection by identifying relationships, hierarchies and connections between ideas.

In rural contexts, where educational resources are often limited, these tools become an accessible and effective pedagogical strategy. According to Ríos-Carrascal (2017), graphic organisers not only improve the understanding of content, but also strengthen the ability to argue and make informed decisions, therefore, their implementation encourages the active participation of students, who become the protagonists of their own learning process, thus highlighting the importance of adapting pedagogical strategies to the socio-cultural and contextual characteristics of students, thus ensuring their relevance and effectiveness.

Critical skills in vocational education

Accordingly, Shamim (2017) emphasises the relevance of critical thinking in vocational education, highlighting that this competence is fundamental for ethical decision-making and problem-solving in work environments. In an increasingly complex and dynamic world of work, critical skills enable professionals to analyse situations, evaluate alternatives and make informed decisions that consider both technical and ethical aspects.

From a pedagogical perspective, critical thinking should be a cross-cutting component in vocational training programmes, as it prepares students to face the challenges of a constantly changing work environment. This includes the ability to adapt to new technologies, work in interdisciplinary teams and solve problems creatively and efficiently, and Shamim (2017) highlights that the development of critical thinking in vocational education not only benefits individuals, but also contributes to the improvement of organisations and society in general, by training professionals who are responsible and committed to their environment.

Professional learning communities

In this sense, Varas-Rivera (2024) introduces the concept of professional learning communities as a key space for the development of critical thinking in students and teachers, these communities are characterised as collaborative environments where participants share experiences, reflect on their practices and build knowledge together. From a pedagogical perspective, these communities encourage critical reflection, dialogue and the exchange of ideas, which contributes to the strengthening of critical competences and the improvement of educational practices.

In the educational field, professional learning communities can be implemented as continuous training spaces for teachers, where reflection on their practices and the search for solutions to educational challenges are promoted. Likewise, these communities can include students, who, by participating in collaborative learning processes, develop critical and social skills that allow them to face the challenges of their environment; therefore, Varas-Rivera (2024) highlights that this model not only benefits individuals, but also strengthens educational institutions by promoting a culture of continuous learning and constant improvement.

METHOD

The research from a methodological context was developed under a qualitative, phenomenological approach, aimed at understanding the experiences, perceptions and meanings attributed by teachers to the teaching-learning process at the Madre Laura Educational Institution, in Tierralta, Córdoba, Colombia, which allowed us to explore the experiences of the participants in relation to the use of pedagogical strategies, such as graphic organisers, and their impact on the development of critical thinking and metacognition.

Interviews were conducted with key informants, who for this study were 10 teachers who teach at the middle school level at the Madre Laura Educational Institution in Tierralta, Córdoba, Colombia. These interviews allowed us to explore the teachers' perceptions and experiences of pedagogical practices and the use of strategies to foster critical thinking and metacognition. The results of the interviews were systematised in Table 1, which summarises the teachers' perceptions of the use of graphic organisers.

Likewise, the research was supported by the feasible project modality, which consists of the development of a viable and contextualised proposal to address the needs identified in the diagnosis. In this case, the Pyramid of Critical-Metacognitive Thinking (PPCM) was designed as a pedagogical tool that integrates innovative strategies adapted to the urban context of the institution, with the aim of strengthening the teaching-learning processes and promoting the development of critical and metacognitive skills in students.

The development of the study was structured in the following methodological phases:

Exploration of the educational phenomenon:

Semi-structured interviews were conducted with 10 teachers to identify their perceptions, experiences and meanings around the use of pedagogical strategies, such as graphic organisers, and their impact on the development of critical thinking and metacognition. The socio-cultural conditions and resources available in the institution were analysed.

Design of the pedagogical proposal:

Based on the findings obtained in the exploratory phase, the Pyramid of Critical-Metacognitive Thinking (PPCM) was developed, integrating pedagogical strategies such as problem-based learning (PBL), the use of graphic organisers and the comparison of correct and erroneous examples.

Validation of the proposal:

The PPCM was submitted to the review of 5 experts in pedagogy and education, who assessed its feasibility, relevance and coherence with the identified needs. Adjustments were made to the proposal based on the comments and suggestions of the experts and the teachers interviewed.

RESULTS

This section presents a summary of the interviews conducted with the teachers of the Madre Laura Educational Institution. The results reflect the teachers' experiences and opinions on the use of pedagogical strategies, especially graphic organisers, and their impact on the development of critical thinking and metacognition in the students, in this sense, it is presented:

Table 1. Summary of interviews on graphic organisers.

Question	Interviewees' Responses
What are graphic organizers?	- Visual tools that organize and synthesize information in a clear and structured way. - Represent concepts hierarchically, didactically, and attractively. - Diagrams, charts, or infographics that facilitate understanding. - Help relate ideas and synthesize information accurately.
Do you believe that graphic organizers help develop critical thinking? Why?	- Everyone agrees that they do help with critical thinking. - Allow for organizing and analyzing information. - Promote reflection and the connection of concepts with prior knowledge. - Help synthesize ideas and structure them logically. - Facilitate argumentation and the formation of judgments based on the presented information.
What types of graphic organizers do you use in your teaching practice and why?	- Concept maps: The most used due to their clarity and ease in organizing ideas. - Mind maps: Dynamic and easy to understand. - Synoptic charts: Useful for synthesizing information hierarchically. - Timelines: Represent chronological events. - Diagrams (bar charts, fishbone diagrams, circular diagrams): Depending on the topic.
How does the use of graphic organizers promote the development of students' critical thinking?	- Help analyze and structure information logically. - Relate concepts to prior knowledge and the environment. - Encourage reflection on the studied topics. - Allow for synthesizing ideas and generating conclusions. - Facilitate the comparison and argumentation of perspectives. - Develop metacognitive processes.

Source: Own elaboration.

As shown in table 1, graphic organisers are essential pedagogical tools, as they facilitate the organisation and synthesis of information in a clear, structured and visually attractive way. According to the teachers interviewed, these strategies not only support the understanding of content, but also enhance the development of critical thinking in students by promoting skills such as analysis, reflection, synthesis and argumentation.

The most commonly used graphic organisers, such as concept maps, mind maps and synoptic tables, stand out for their versatility and adaptability to different subjects and learning levels, which makes them accessible resources for both teachers and students. In this sense, their implementation in the classroom not only enriches the teaching-learning processes, but also promotes deeper, reflective and meaningful learning, in line with the objectives of a comprehensive and critical education.

PROPOSAL ON THE CRITICAL-METACOGNITIVE THINKING PYRAMID (CCMP) AS A PEDAGOGICAL RESOURCE IN THE TEACHING-LEARNING PROCESS

Critical thinking has become one of the most valued skills in various areas of human life, as it allows people to perform efficiently in any task. Therefore, those who manage to develop this ability acquire tools, skills and characteristics that will be useful throughout their lives. In this context, we present a tool designed to enhance both critical thinking and metacognition, which can be used as a learning strategy for students and as a pedagogical resource for teachers in the educational field.

Critical-Metacognitive Thinking Pyramid (CMCP)

Definition: The PPCM is a graphic organiser that facilitates the development of critical thinking by allowing a structured, systematic and global analysis of phenomena or problematic issues. Its use promotes:

(a) The selection of key concepts in a text.

b) The organisation of concepts into categories of analysis.

c) The identification of the central theme of a text, as well as the main idea and secondary ideas.

d) Analysing the causes and effects of a phenomenon.

e) The formulation of theses and conclusions.

f) The proposal of solutions to the problems studied.

g) The analysis of phenomena from multiple perspectives: social, political, economic, cultural, educational, religious, environmental, among others.

Structure: The Critical-Metacognitive Thinking Pyramid (CMCP) has the shape of a quadrangular pyramid, i.e. a polyhedron with a square base and four triangular lateral faces, as illustrated in figure 1.

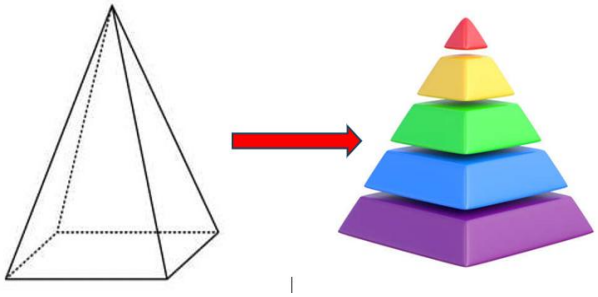

Figure 1. *Structure of the Critical Metacognitive Thinking Pyramid (CMCP).*
Source: Own elaboration.

Each of the faces of the pyramid presented in figure 1 deals with a different area or perspective related to the subject proposed by the author. Given that the pyramid has four faces, the student is free to decide, autonomously, which dimensions he/she wishes to work on, considering that a problem can be analysed from different approaches.

On the other hand, Figure 2 shows the structure of one of the faces of the Critical-Metacognitive Thinking Pyramid, the elements that compose it and the process to build and interpret it. It is important to note that all the faces are constructed and analysed following the same procedure; what varies are the concepts, as these depend on the specific domain being examined.

Figure 2. *How to interpret one side of the Critical Metacognitive Thinking Pyramid (CMCP)?*
Source: Own elaboration.

How is a Critical-Metacognitive Thinking Pyramid (CMCP) developed?

The steps proposed below allow the learner to plan, monitor and evaluate the activity he/she carries out on an ongoing basis. This process facilitates the organisation, analysis and interpretation of the information that the student considers relevant to understand the problem posed.

First step:

Starting from the problem selected by the student, either through observation of their environment, previous experiences, preconceptions or reading a text, they must identify and select the key concepts and ideas. These elements will be the fundamental basis for constructing the CPMP. See figure 3.

COLOMBIA SE ENFRENTA AL RIESGO DE QUEDARSE A OSCURAS ANTE LA FALTA DE ENERGÍA: Colombia se asoma en estos días al abismo del racionamiento eléctrico. La lluvia no ha llegado en abundancia como esperaba el Gobierno en abril y la sequía que produce el fenómeno de El Niño se ha agravado. Las reservas hídricas están al 29%, según los últimos datos de XM, la empresa encargada de operar el sistema eléctrico. Es apenas dos puntos porcentuales por encima del nivel crítico de 27%, que forzaría al país al primer racionamiento eléctrico en más de 30 años. Las alarmas se han encendido y han puesto el tema en el centro de la agenda. Aunque el ministro de Minas y Energía, Omar Andrés Camacho, ha reiterado que pronto lloverá y que se podrá evitar el racionamiento, los expertos consultados alertan de que no hay certezas.

Parte del problema se encuentra en la matriz energética del país, según explica por videollamada José Reinaldo Vuelvas, director de la maestría de Energía y Sostenibilidad de la Universidad Javeriana. "La energía hidráulica representa el 70% del suministro y es nuestro mayor beneficio porque hace que nuestra matriz sea muy limpia. Pero también es nuestro peor enemigo porque, a la vez, nos hace muy dependientes del clima", remarca. Si llueve poco, los embalses se vacían y las turbinas se quedan sin posibilidad de generar energía. Las centrales térmicas, con gas, carbón y líquidos, no alcanzan el 30% en condiciones normales. Las energías renovables no convencionales, en tanto, todavía son marginales.

Otra parte del problema es que la demanda ha aumentado un 7,5% entre marzo y el mismo mes del año anterior, según datos de XM. Es el triple que el crecimiento promedio de 2,5% que se solía registrar cada año. El incremento ha sido del 10,5% en el Caribe, una región que ha padecido especialmente las altas temperaturas de El Niño y que ha tenido mayor necesidad de aumentar el consumo de energía para los mecanismos de refrigeración. El sistema no da abasto: las lluvias actuales solo permiten generar 60 gigavatios hora día de los 232 que se necesitan.

LUCAS REYNOSO, Bogotá - 17 ABR 2024. https://elpais.com/america-colombia/2024-04-18/colombia-se-enfrenta-al-riesgo-de-quedarse-a-oscuras-ante-la-falta-de-energia.html

Figure 3. *Text that provides information for developing the CPMP.*
Source: Researcher, adapted from (Reynoso, 2024), Colombia faces the risk of going dark due to lack of energy.

The text above (figure 3) serves as an example to illustrate what a student would do in step #1.

Second step:

In this second step, the student must organise in a hierarchical way the keywords previously selected in the text, following a cause-effect scheme. In this way, the concept or idea that, according to the student, originates the whole problem raised in the document should be placed at the top of the pyramid. Figure 4 shows how the key words selected in the reading of the previous example would be organised.

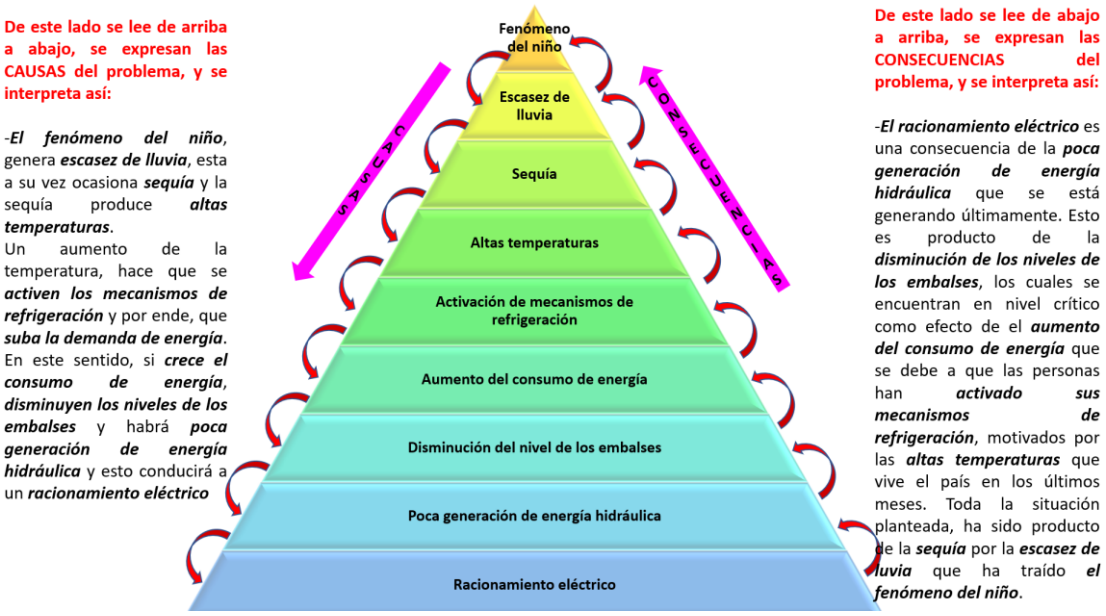

Figure 4. *Initial organisation of key concepts indicating cause-effect and vice versa.*
Source: Own elaboration.

Third step:

In this step, the student is asked to analyse the issue raised in the document from different perspectives. To do this, they must select the perspectives they wish to compare and fill in a table, as shown in figure 5.

It is essential to note that, in order to fill in the table presented in figure 5, the student must start from the main topic. In the case of the example, the topic is the El Niño phenomenon. To analyse the environmental perspective, the student could ask the question: What effects does the El Niño phenomenon have on the environment? One possible answer would be: low rainfall, which in turn leads to increased drought, which leads to high temperatures. These temperatures can cause forest fires, leading to the destruction of ecosystems and loss of biodiversity.

EL FENÓMENO DEL NIÑO				
	Cara 1 de la pirámide	Cara 2 de la pirámide	Cara 3 de la pirámide	Cara 4 de la pirámide
	Dimensión Ambiental	Dimensión Social	Dimensión Económica	Dimensión Política
Subtema 1	Poca lluvia	Deshidratación de las personas	Disminución de la producción agropecuaria	Reglamentación de medidas de ahorro de agua y energía
Subtema 2	Más sequía	Problemas de salud	Escasez de productos	Desacuerdos políticos
Subtema 3	Altas temperaturas	Hacinamiento en los hospitales	Aumento del precio de productos agropecuarios y derivados	Conflictos entre las ramas del poder
Subtema 4	Incendios forestales	Propagación de enfermedades	Menos ganancias para las empresas	Desestabilidad política
Subtema 5	Destrucción de ecosistemas y perdida de biodiversidad	Aumento de la tasa de mortalidad	Cierre de empresas	Crisis del gobierno

Figure 5. *Analysis of the problem from different perspectives.*
Source: Own elaboration.

As can be seen in figure 5, during the analysis of each area, concepts emerge that were not explicit in the initial text. However, as the student goes deeper into the study of the problem, these concepts emerge as implicit causes and effects, which leads the student to carry out processes of inference and deduction.

Fourth step:

In this step, the student is asked to organise the information contained in the table within a Critical-Metacognitive Thinking Pyramid (CMCP). This exercise aims to facilitate processes of interpretation and argumentation that allow the formulation of assumptions, hypotheses and possible solutions to the various problems identified from the initial analysis. The focus on different perspectives helps to size up the magnitude of the problem and to explore how it could be tackled from different approaches. See figure 6.

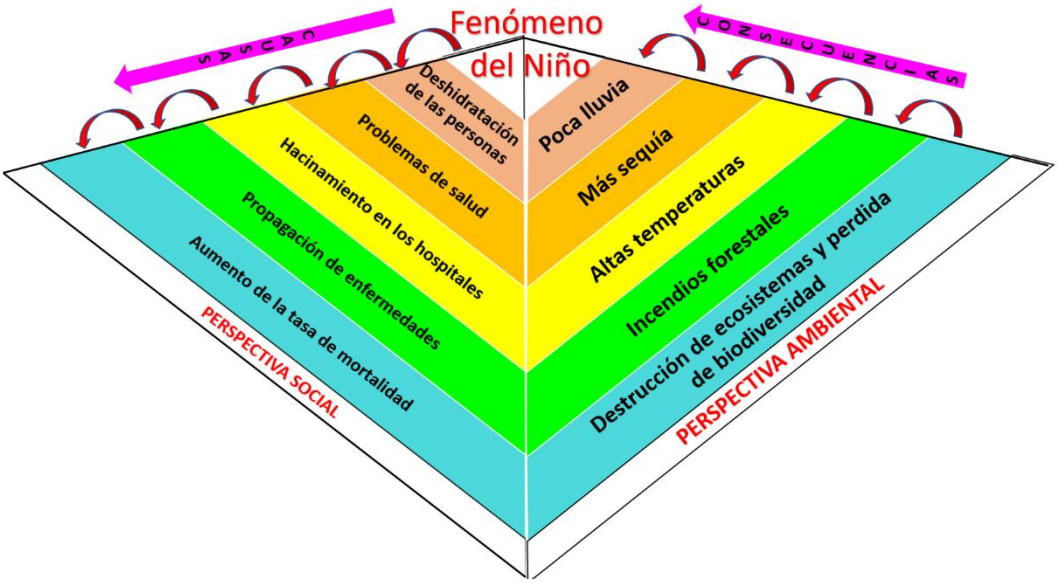

Figure 6. *Side view of the environmental and social perspectives of the CFMP.*
Source: Own elaboration.

Figure 6 shows how the concepts related to the El Niño phenomenon, analysed from the social and environmental perspectives, are organised. This organisation, from top to bottom, reflects a cause-effect relationship, where the initial concept generates the next one. For example, in the environmental sphere, the El Niño phenomenon is the cause of the drought.

Figure 7 presents the other two sides of the pyramid, which in the case of the example correspond to the political and economic domains.

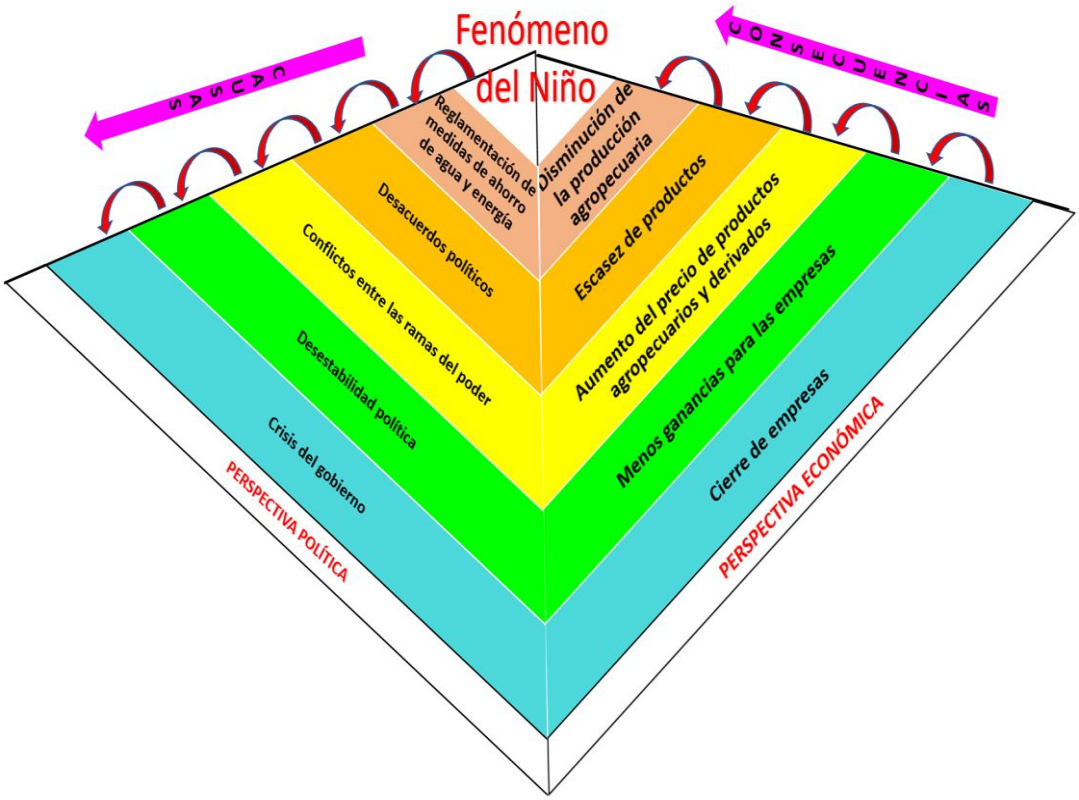

Figure 7. *Side view of the political and economic perspectives of the CFSP*
Source: Own elaboration.

From figure 7, the four faces of the pyramid are completed, which serve as a basis for the student to carry out writing and argumentation processes on the various problems posed, these faces allow viable solution alternatives to be proposed, which contributes to the development of critical thinking and the possibility of transforming the context.

Figure 8 below shows an overview of the Critical-Metacognitive Thinking Pyramid (CMCP) corresponding to the example we are analysing.

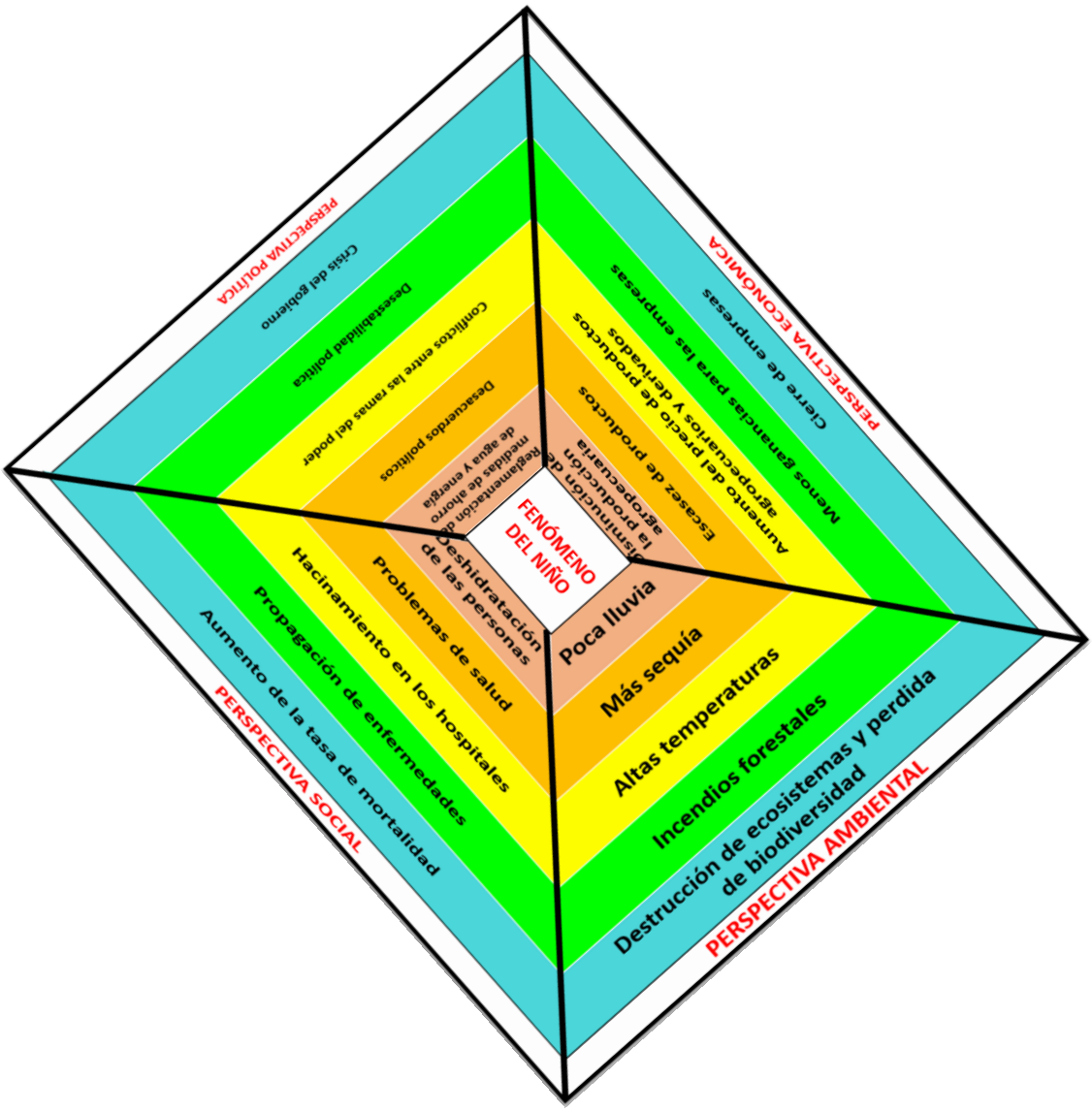

Figure 8. *Overview of the MCWP.*
Source: Own elaboration.

Fifth step:

In this step, the student is asked to carry out a monitoring of the work developed so far, with the aim of identifying possible inconsistencies and making the necessary adjustments. After this review, the student is asked to write a text, either inductive or deductive, in which he/she addresses the problem posed from different perspectives, relating causes and effects in each of them with solid arguments and backed by reliable sources. In addition, they must express their position, either in favour or against the subject dealt with, justifying it in a clear, precise and well-founded manner. Finally, they are asked to propose viable alternative solutions that contribute to transforming the analysed reality.

It is important to highlight that the development of the PPCM facilitates the student's theoretical construction of the inductive or deductive text. If they organise their writing by starting with the

concepts at the top of the pyramid and moving towards those at the base, the text will be inductive. Conversely, if you start from the concepts at the base and move towards the concepts at the top, the text will be deductive.

Advantages of the use of CPMPs

The use of CPWPs by students and teachers as learning and teaching tools in classroom activities contributes significantly to the development of dispositions, intellectual characteristics, skills, elements, metacognitive control and intellectual standards necessary to assess both critical thinking and metacognition. The advantages derived from the use of CPWPs are presented in Figure 9 below:

	DISPOSICIÓN AL PENSAMIENTO CRITICO	ELEMENTOS DEL PENSAMIENTO CRITICO	ESTÁNDARES INTELECTUALES DEL PENSAMIENTO CRITICO	HABILIDADES DEL PENSAMIENTO CRITICO	CARACTERÍSTICAS INTELECTUALES DEL PENSAMIENTO CRITICO	CONTROL METACOGNITIVO PARA LA MEJORA DEL PENSAMIENTO CRITICO
ANTES DE LA TAREA	-Estar motivado -Ser curioso -Ser indagador -Buscar la verdad	-Pensar con propósito -Generar preguntas	-Claridad (delimita el problema) -Exactitud (cita fuentes fiables) -Precisión (es específico)	- Percibir - Observar - Identificar - Preguntar	-Humildad intelectual - Empatía intelectual	**Planifica:** -Piensa en varias maneras de hacerlo. -Traza un objetivo. -Sabe qué va a aprender -Organiza su tiempo
DURANTE LA TAREA	-Tener mente abierta -Ser analítico -Ser organizado y concentrado -Ser holístico	-Revisar información fiable -Analizar conceptos -Comparar perspectivas -Realizar inferencias -Prever consecuencias -Plantear supuestos	-Relevancia (es pertinente con el problema) -Profundidad (trata la complejidad) -Amplitud (es multiperspectivo) -Lógica (es coherente) -Importancia (se centra en el problema principal)	- Buscar - Comparar - Analizar - Deducir - Inferir - Juzgar - Considerar razones - Integrar - Suponer - Concluir	-Confianza en la razón -Perseverancia intelectual -Entereza intelectual -Integridad intelectual	**Supervisa:** -Da cuenta de las estrategias que usa –Se detiene para reflexionar sobre lo que hace -Trata de identificar ideas clave
DESPUÉS DE LA TAREA	-Hacer juicios de forma reflexiva -Sentirse seguro de sí mismo -Autoevaluarse -Retroalimentar el trabajo -Actual con convicción	-Evaluar el pensamiento -Actuar para transformar -Solucionar	-Justicia (es imparcial en la toma de decisiones) -Autonomía (no depende de los demás)	- Aplicar - Solucionar - Evaluar - Reflexionar - Retroalimentar - Actuar - Transformar	-Autonomía intelectual -Imparcialidad	**Evalúa:** -Se pregunta si había otra forma mejor de hacerlo. -Evalúa el resultado para hacer correcciones necesarias.

Figure 9. *Advantages derived from the use of PPCMs.*
Source: Own elaboration.

CONCLUSION

Critical thinking is a fundamental skill in the educational process, as it allows students to analyse, reflect and make decisions in a conscious and informed manner. In this sense, the Pyramid of Critical-Metacognitive Thinking (PPCM) is presented as a pedagogical tool that facilitates learning by organising and structuring ideas in a clear and understandable way. This strategy helps students to identify concepts, establish cause and effect relationships, analyse problems from different perspectives (social, political, economic, environmental, among others) and propose creative and viable solutions. It also seeks to foster attitudes such as curiosity, motivation and the search for truth, while developing skills such as observing, analysing, inferring and evaluating.

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