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INTERNATIONAL REFERENCE FRAMEWORKS FOR TEACHER TRAINING IN DIGITAL COMPETENCES: A COMPARATIVE DOCUMENTARY ANALYSIS

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Abstract

The digital transformation of education has positioned teacher training in digital competences as a strategic axis of educational policy, pedagogical innovation, and professional development. In response, international organizations, ministries of education, and specialized agencies have produced frameworks, standards, guidelines, and policy documents intended to define what teachers should know and be able to do in digitally mediated educational settings.

However, the diversity of approaches, labels, scopes, and levels of operational detail makes it difficult to understand their points of convergence, divergence, and omission in comparative terms. The aim of this study was to comparatively analyze international frameworks, guidelines, and policy documents on teacher training in digital competences. A qualitative study was conducted through a comparative documentary analysis of a corpus of 40 documents published between 2007 and 2026. The corpus was organized in a documentary review matrix and examined through five categories: theoretical-conceptual foundations in ICT and LKT, teacher training pathways, pedagogical integration of ICT and LKT, AI literacy, and digital formative assessment.

The findings show that the international field of teacher digital competence is broad but heterogeneous. The dominant discourse is organized around ICT, digital competence, digital literacy, and digital transformation, while LKT appears less explicitly and is more often inferred through pedagogical interpretation.

The corpus also reveals flexible and progressive training pathways, broad but uneven models of pedagogical integration, an emerging yet still non-transversal incorporation of AI literacy, and an uneven treatment of digital formative assessment. The study concludes that international reference frameworks provide a robust foundation for teacher training in digital competences, although they require pedagogical and institutional contextualization in order to respond more effectively to contemporary teacher education needs.

Keywords: Digital competence; teacher training; ICT; LKT; artificial intelligence literacy; digital frameworks

1. Introduction

In current debates on university education, critical thinking has acquired a normative status that positions it as one of the central educational aims. Nevertheless, it is often assigned a restricted meaning that equates it with an argumentative skill or a generic competence detached from

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concrete epistemological contexts. This simplified understanding becomes particularly problematic within an academic ecosystem characterized by information overproduction, the accelerated circulation of ideologically biased content, and the intensification of public controversies that strain the possibility of sustaining well-grounded processes of rational deliberation. Under such conditions, critical thinking cannot be reduced to a technical repertoire. Rather, it must be understood as an epistemological rationality that regulates the subject's relationship with knowledge by enabling the distinction between facts and value judgments, the demand for evidence, the comparison of sources, and the formulation of claims with validity pretensions [1]-[2].

From an interpretive perspective, critical thinking does not operate in a vacuum nor does it activate automatically. Instead, it is configured within specific historical, social, and educational contexts that shape the ways in which knowledge is produced, legitimized, and questioned. Consequently, its analysis requires a shift away from the measurement of observable outcomes or the mere enumeration of competencies toward an examination of the foundations that confer meaning upon critical thinking as a criterion of epistemic validation. Within this framework, critical thinking is expressed as a deliberate practice of intellectual self-regulation that disciplines inference, constrains interpretive arbitrariness, and enables the formulation of revisable judgments that can be justified and contested through relevant evidence. This form of rationality resists both paralyzing skepticism and the uncritical acceptance of socially naturalized statements, thus consolidating a horizon of cognitive responsibility in which making a claim entails assuming the epistemic and ethical consequences of one's judgment [3]-[1]-[4].

The specialized literature converges on the view that understanding critical thinking as an integral competence requires recognition of its internal structure as a dynamic system of interdependent dimensions. On the one hand, cognitive skills have been extensively systematized, most notably in the Delphi Report of the American Philosophical Association, which identifies processes such as interpretation, analysis, evaluation, inference, explanation, and self-regulation [5]. On the other hand, critical thinking presupposes intellectual and ethical dispositions that make the situated activation of these skills possible, including perseverance in the face of complexity, recognition of one's own cognitive limits, openness to dialogue with divergent perspectives, and autonomy in judgment formation [6]-[7]-[8]-[9]-[10]. To these dimensions must be added knowledge as an indispensable substrate, since critical reasoning cannot occur without conceptual frameworks, disciplinary information, and accumulated experience that provide content and coherence to analysis [11]-[12]-[13]. This dimensional architecture demonstrates that teaching or assessing critical thinking as a transversal skill detached from knowledge and dispositions constitutes a simplification that weakens both its formative potential and its ethical depth.

Against this problematic backdrop, the present study is situated within the interpretive paradigm and adopts a qualitative, theoretical–interpretive approach aimed at understanding critical thinking as a competence for knowledge validation. The analysis focuses on its

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epistemological purpose, its constitutive features, and its dimensional structure based on skills, dispositions, and knowledge. The central argument advanced here is that critical thinking should not be conceived as an innate attribute or as a set of didactic techniques, but rather as a formative practice constructed through specific pedagogical and cultural conditions. These include exposure to diverse perspectives, engagement with scientific and humanistic reading, and the reasoned comparison of sources, all of which expand the subject's interpretive horizon and strengthen intellectual autonomy [14]-[15]-[16]-[17].

In line with this approach, the general objective of this research is to provide an interpretive analysis of critical thinking as an integral competence for knowledge validation by describing its epistemological purpose, its constitutive characteristics, and its dimensional structure. The aim is to substantiate its formative relevance and its ethical and social implications in contemporary academic contexts. This objective entails a clear theoretical stance: when understood in an integral sense, critical thinking constitutes a form of epistemic governance that is indispensable for higher education, as it enables the formulation of evidence-based judgments, the revision of beliefs in light of argumentation, and responsible deliberation in contexts of uncertainty and controversy without falling into dogmatism or relativism. In this regard, the study offers a systematized and pedagogically oriented reading that may be of particular value to researchers in training and to postgraduate programs seeking to ground curricular designs and assessment strategies that acknowledge the complexity of critical thinking as a cognitive, dispositional, and epistemologically situated practice [18]-[8]-[2]-[10].

1. Methodology

This study is grounded in the interpretive paradigm, which conceives knowledge not as an objective or neutral entity, but as a situated construction that emerges from the meanings attributed to practices, discourses, and educational processes within specific historical and social contexts. From this perspective, the research is not oriented toward causal explanation or variable measurement, but toward a deep understanding of the epistemological, formative, and ethical meanings that configure critical thinking as an object of analysis. Accordingly, the research interest focuses on interpreting how critical thinking is conceptualized, structured, and projected within contemporary higher education, with particular attention to its function as a criterion for knowledge validation [18].

In alignment with this epistemological stance, the study adopts a qualitative theoretical–interpretive approach aimed at analyzing critical thinking as an integral competence for knowledge validation. This approach privileges the reflective examination of conceptual constructs, theoretical models, and epistemological frameworks rather than the estimation of empirical frequency or the measurement of quantifiable impact. Its relevance lies in its capacity to problematize complex educational categories and to re-signify them in light of contemporary debates on higher education, epistemology, and the ethics of knowledge [19].

The analytical process was structured through a hermeneutic method articulated in three interconnected stages. The first stage, corresponding to pre-understanding, involved a panoramic, contextualized, and critical reading of key sources related to critical thinking,

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epistemology, and higher education, with the aim of identifying dominant approaches, theoretical convergences, and relevant conceptual tensions. The second stage consisted of an interpretive analysis focused on the identification, delimitation, and organization of analytical categories such as conceptualizations of critical thinking, cognitive skills, intellectual dispositions, the relationship between general and discipline-specific approaches, didactic mediations, and evaluation criteria. The final stage involved a critical synthesis based on the interpretive triangulation of these categories, which enabled the development of an integrated argument concerning the role of critical thinking in knowledge validation and its formative, ethical, and social projection in contemporary academic contexts.

The primary methodological strategy was an interpretive review of scientific literature based on academic texts available in the conversational library, including peer-reviewed journal articles, book chapters, and open-access academic books [10]. Source selection followed two complementary criteria. The first was theoretical relevance, understood as the contribution of the texts to defining critical thinking, systematizing its dimensions, and addressing epistemological debates regarding its nature, scope, and function in higher education. The second criterion was didactic pertinence, referring to the capacity of the sources to provide conceptual and formative guidance related to curricular design, the formulation of academic tasks, the use of problematizing questions, the construction of learning scenarios, and the assessment of critical thinking in university contexts.

The units of analysis consisted of textual passages that explicitly defined critical thinking, described its skills and dispositions, examined the relationship between general and specific approaches, and proposed curricular or formative strategies for its development. Information analysis was conducted by considering both the conceptual coherence among the sources and the formative usefulness of their arguments, with the aim of providing an interpretive foundation for the relevance of critical thinking in academic training and in ethical and social decision-making processes.

Citations and references were documented in accordance with APA standards, ensuring traceability, transparency, and verifiability throughout the analytical process. This combination of interpretive rigor and explicit bibliographic support made it possible to substantiate the study's claims with recognized theoretical evidence, in line with the quality standards required in doctoral-level academic publications and high-impact scientific journals.

3. Results

Critical thinking is conceived as an essential cognitive process aimed at structuring, analyzing, and articulating concepts, ideas, and knowledge in a logical and systematic manner. From an epistemological perspective, this form of thinking enables individuals to adopt well-founded positions in relation to specific phenomena or situations by fostering a rational approach that transcends biases, unfounded beliefs, and purely subjective judgments. The concept of critical thinking is etymologically rooted in the Latin term *pensare*, associated with the act of thinking, and the Greek term *krinein*, which refers to the act of distinguishing, separating, or judging.

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This dual semantic origin points to the capacity to examine reality reflectively by discerning its components in order to arrive at reasoned understanding.

Within academic and scientific contexts, critical thinking is understood as a rational and deliberative process oriented toward the objective analysis of phenomena, with the purpose of distinguishing observable facts from the value judgments that often accompany them. This mode of reasoning stands in opposition to the uncritical acceptance of socially naturalized claims or assertions presented as unquestionable truths, including those that generate ethical and moral debates such as same-sex marriage or voluntary interruption of pregnancy. In such cases, critical thinking promotes analysis grounded in evidence, argumentation, and source comparison rather than in preconceived positions or prejudicial assumptions. In this way, it is configured as a fundamental tool for achieving a deeper, more reasoned, and well-substantiated understanding of social and scientific reality [1]-[2].

3.1. Purpose of Critical Thinking

Critical thinking may be understood as an intellectual disposition oriented toward examining reality in a reflective, systematic, and rationally grounded manner. Its purpose is not limited to the expression of individual opinions or the formulation of intuitive judgments, but is instead closely linked to the validation of knowledge through procedures that ensure epistemological consistency. In this sense, critical thinking is directed toward the construction of well-founded, ethically responsible, and verifiable statements, thereby overcoming the acceptance of claims that lack sufficient grounding or that rely exclusively on personal beliefs or unexamined consensus [3]-[10].

From this perspective, the purpose of critical thinking is articulated through practices such as systematic observation, empirical experience, source comparison, and, in contexts of greater academic rigor, the application of the scientific method. These procedures not only make it possible to assess the validity of available information, but also regulate the production of knowledge by establishing criteria to distinguish between relevant evidence, reasoned interpretation, and unjustified opinion. In this way, critical thinking is configured as a mechanism of epistemic self-regulation that guides the subject's relationship with knowledge and with the processes of legitimation that sustain it.

The exercise of critical thinking requires the rigorous collection of evidence, the comparison of information drawn from reliable sources, and the adoption of an analytical stance aimed at reducing the influence of cognitive, affective, or ideological biases. Within this framework, thinking critically does not entail indiscriminate doubt, but rather the submission of claims to rational scrutiny proportional to their complexity and to the consequences of their acceptance. This intellectual practice seeks a reflective balance between extreme skepticism, which can paralyze action, and the uncritical acceptance of socially naturalized statements, thereby promoting a responsible attitude toward knowledge [1].

From the perspectives of pedagogy and philosophy of mind, the purpose of critical thinking is closely associated with the formation of individuals capable of examining arguments,

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recognizing and problematizing both their own prejudices and those of others, and systematically evaluating the reliability, relevance, and coherence of consulted sources. This process involves the rational organization of available information, the identification of implicit assumptions, and their submission to analysis, which in turn fosters a deeper and more complex understanding of the phenomena under study. Consequently, critical thinking contributes to the construction of a solid personal criterion that guides decision-making in academic, professional, and everyday contexts, strengthening intellectual autonomy and the ethical responsibility of judgment [3]-[1].

3.2. **Benefits of the Development of Critical Thinking**

Critical thinking is not configured as an innate capacity or as a spontaneous outcome of cognitive development, but rather as a competence that is progressively constructed through formative experiences that stimulate reflective analysis and reasoned confrontation of ideas. Its development requires educational and cultural contexts that promote exposure to a diversity of perspectives, access to scientific and humanistic production, and dialogue with alternative interpretive frameworks. Such experiences expand the individual's intellectual horizon and strengthen the capacity to examine information rigorously, thereby avoiding simplistic or uncritical approaches to reality[14].

At the level of personal development, one of the most significant benefits of critical thinking lies in the disposition to consider new ideas and to question beliefs that have been adopted without prior reflection. This process facilitates the transformation of rigid cognitive schemes and fosters intellectual autonomy, understood as the ability to sustain one's own judgments on the basis of argumentation and evidence. Moreover, the systematic exercise of critical thinking contributes to more ethically conscious decision-making, particularly in complex scenarios where diverse interests, values, and consequences converge, as it enables the evaluation of alternatives through integrated rational and moral criteria [16]-[17]-[10].

In academic and professional contexts, critical thinking is consolidated as a strategic resource that strengthens the profile of individuals who are analytical, reflective, and less susceptible to informational or discursive manipulation. Its practice promotes a deeper understanding of problems, the rigorous evaluation of processes, and the formulation of well-founded improvement proposals, qualities that are especially valued in institutional and organizational environments that demand informed and responsible decision-making. In this regard, critical thinking makes a substantial contribution to the development of research competencies, academic innovation, and ethically oriented professional performance [17].

Complementarily, the development of critical thinking has a positive impact on the individual's ability to engage with complex informational environments characterized by the massive circulation of data, opinions, and persuasive discourses. By strengthening the capacity to compare sources, assess the reliability of information, and recognize explicit or implicit biases, critical thinking reduces vulnerability to misinformation and promotes more conscious and responsible information consumption practices. This benefit is particularly significant in

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contemporary digital contexts, where the speed of content circulation often exceeds processes of verification and reflective analysis.

Taken together, these benefits support the claim that the development of critical thinking not only enhances individual cognitive performance, but also contributes to the formation of individuals capable of rational deliberation, ethically responsible action, and informed participation in increasingly complex academic, professional, and social contexts. From this perspective, fostering critical thinking in higher education constitutes a high-impact formative investment aimed at strengthening both intellectual autonomy and the quality of decision-making under conditions of uncertainty.

3.3. Características principales del pensamiento crítico

Critical thinking is configured as a complex and systematic cognitive process that goes beyond the mere accumulation of information and is oriented toward the reasoned understanding, evaluation, and appraisal of reality. Within the specialized literature, this competence is conceived as a sustained intellectual practice that integrates analytical rigor, self-reflection, and openness to revision, thereby conferring epistemological depth and formative relevance. In this sense, critical thinking does not manifest as an occasional activity, but rather as a habitual mode of engaging with knowledge and with the interpretive processes that sustain it.

One of the central features of critical thinking is **objectivity,** understood not as absolute neutrality, but as the deliberate effort to formulate conclusions grounded in reliable, verifiable, and contrasted information. This form of objectivity entails acknowledging the inevitable presence of interpretive frameworks and consciously managing one's own biases throughout the analytical process, preventing unfounded beliefs or personal preferences from distorting judgment. Accordingly, critical objectivity is configured as a regulative ideal that guides the search for coherent and justifiable explanations, rather than as the complete elimination of subjectivity [21]-[22]-[10].

Rigorous observation constitutes another fundamental component of critical thinking, as it represents the starting point of the analytical process. This characteristic involves systematic and selective attention to phenomena, transcending superficial perception in order to identify relevant aspects that are susceptible to problematization. Through rigorous observation, individuals formulate pertinent questions, delimit the object of analysis, and establish the foundations for well-grounded inquiry, thereby orienting reasoning toward a deeper understanding of the reality under examination [23].

Analytical capacity is expressed as the ability to decompose complex problems into their essential components, identify meaningful relationships, and establish logical connections between concepts and evidence. This characteristic facilitates the construction of coherent explanations and the development of consistent interpretive frameworks, avoiding fragmentary or purely intuitive approaches. Within the exercise of critical thinking, analysis is not limited to describing the elements involved, but seeks to understand their interrelations and consequences, thereby strengthening the robustness of the judgments produced [24].

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Intellectual inquiry constitutes an indispensable characteristic of critical thinking, as it drives the continuous search for information, the questioning of previously accepted assumptions, and openness to new perspectives. This feature reflects an attitude of epistemological curiosity that broadens the individual's cognitive horizon and promotes the integration of diverse and complementary sources. Through inquiry, critical thinking is nourished by conceptual contrasts and tensions that enrich analysis and prevent the crystallization of unexamined certainties [22].

Finally, **continuous reflection** confers a dynamic and dialogical character upon critical thinking. The conclusions reached are not assumed to be definitive, but rather provisional and open to revision in light of new evidence or more robust arguments. This disposition toward ongoing revision prevents dogmatic positions and fosters an intellectually flexible attitude oriented toward continuous learning and the refinement of rational judgment. In this sense, continuous reflection consolidates critical thinking as a revisable and self-regulated practice, consistent with the epistemological demands of knowledge production [24].

Taken together, these characteristics support the claim that critical thinking is configured as an intellectual habit that requires cognitive discipline, a sustained disposition toward learning, and openness to complexity. Its systematic development in higher education is fundamental to the formation of individuals capable of acting with intellectual autonomy, ethical responsibility, and analytical rigor in academic, professional, and social contexts characterized by uncertainty and constant change [22[-[23].

3.4. Scope and Implications of Critical Thinking

Critical thinking is configured as a competence of high formative and social value whose scope extends beyond the strictly cognitive domain to encompass multiple dimensions of human experience. At the personal level, its practice fosters the individual's integral development by strengthening processes of self-regulation, intellectual self-management, and reflective coherence among beliefs, values, and decisions. Individuals who systematically develop critical thinking tend to construct a more conscious relationship with knowledge, which contributes to a solid intellectual identity and to greater responsibility in decision-making, particularly in contexts characterized by complexity and uncertainty [22].

From the perspective of creativity, critical thinking functions as a catalyst for innovative processes insofar as it combines intellectual curiosity, rigorous analysis, and systematic reflection. This articulation enables not only the critical examination of existing realities, but also the projection of alternatives, the reformulation of problems, and the exploration of possible scenarios. In this sense, criticality is not confined to a logic of questioning or negation, but becomes a reconstructive practice that drives the generation of original ideas and transformative approaches in academic and professional contexts [25]-[10].

Another significant scope of critical thinking relates to the strengthening of judgment in decision-making processes. Subjecting everyday, academic, and professional situations to reflective analysis allows for the evaluation of consequences, the weighing of alternatives, and the anticipation of short- and long-term effects. This form of reasoning reduces the likelihood

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of errors derived from impulsive decisions or from incomplete information, and promotes more coherent and strategic choices. In organizational environments, this competence is associated with strategic thinking, responsible leadership, and the formulation of actions oriented toward the achievement of sustainable objectives, attributes that are particularly valued in managerial and leadership roles [26].

In the contemporary context, marked by the massive circulation of information and the proliferation of misleading content, critical thinking acquires a central function in relation to misinformation. Its practice enables data verification, source comparison, and the differentiation of reliable information from content that lacks empirical or argumentative support. In this way, critical thinking operates as a protective mechanism against media and discursive manipulation, promoting more conscious, ethical, and responsible information consumption practices. This implication is especially significant in digital environments, where the speed of content dissemination often surpasses processes of rational analysis and verification [27].

From a productivity and management perspective, critical thinking facilitates process optimization, the identification of recurrent errors, and the implementation of more efficient strategies in the use of resources. In the domain of conflict resolution, this competence makes it possible to understand the positions of the different actors involved, analyze divergent interests, and construct equitable and sustainable solutions. By promoting reasoned dialogue and the rational evaluation of alternatives, critical thinking contributes to institutional coexistence and to the strengthening of collaborative dynamics oriented toward the common good [22].

It is important to emphasize that critical thinking does not constitute an innate capacity, but rather a competence that can be developed through meaningful educational experiences, exposure to diverse perspectives, and continuous reflection. Its practice is oriented toward the pursuit of critical objectivity, the strengthening of intellectual curiosity, and the demand for evidence to support judgments. In this sense, critical thinking transcends the individual level to become a tool for social transformation, indispensable for addressing ideological polarization, information overload, and contemporary ethical challenges. Consequently, its development contributes to the formation of citizens capable of informed, responsible, and reflective participation in increasingly complex democratic societies [25]-[27]-[10].

3.5. Dimensions of Critical Thinking

Early theoretical approaches to critical thinking focused predominantly on the development of cognitive skills, which for a long time were regarded as the core of this competence. These skills, including analysis, synthesis, inference, and evaluation, enable individuals to break down problems, establish logical relationships, and formulate well-supported conclusions. However, the evolution of research in this field has shown that an exclusively cognitive understanding is insufficient to explain how and when these skills are effectively activated in real-world contexts. In response to this limitation, several authors have broadened the initial focus by incorporating personal dispositions such as open-mindedness, intellectual curiosity,

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and a willingness to question assumptions, elements that condition the effective use of critical thinking in concrete situations [8]-[2]-[10].

From this expanded perspective, critical thinking is increasingly conceived as a competence that integrates not only cognitive skills but also attitudinal components that regulate individuals' intellectual conduct. The interaction between skills and dispositions gives rise to what some authors describe as the behavioral component of critical thinking, insofar as it reflects the ways in which this competence is expressed in academic, professional, and social practices. In this regard, possessing thinking skills does not in itself guarantee effective critical engagement if there is no disposition to apply them in a deliberate, ethical, and context-sensitive manner.

To this bidimensional understanding, a third fundamental element is added, as introduced by Villarini [18], who emphasizes the role of knowledge as an indispensable substrate of critical thinking. From this standpoint, knowledge functions as the content upon which both cognitive skills and intellectual dispositions are activated, providing meaning and direction to the critical process. Thinking critically therefore does not involve merely knowing how to analyze or evaluate, nor simply being willing to do so, but also possessing conceptual frameworks, disciplinary information, and experience that allow analysis to be contextualized and judgments to be formulated with relevance and coherence.

Consequently, critical thinking is currently conceived as an integrative process that dynamically articulates three interdependent dimensions: skills, dispositions, and knowledge. This holistic view makes it possible to grasp the inherent complexity of criticality and avoids reductive interpretations that present it as a generic or decontextualized transversal skill. By recognizing the interdependence of these dimensions, new possibilities emerge for designing more rigorous formative and evaluative strategies capable of balancing cognitive performance, intellectual attitudes, and the individual's knowledge base [18]-[8]-[10].

From a formative perspective, this tridimensional conception of critical thinking is particularly relevant to higher education, as it makes clear that its development does not depend exclusively on training cognitive skills, nor solely on personal motivation, but on the coherent articulation of knowledge, judgment, and ethical disposition. Within this framework, critical thinking is configured as a situated competence that is progressively constructed through educational experiences integrating disciplinary knowledge, reflective practices, and intellectual dispositions oriented toward the self-regulation of judgment.

3.5.1. Skills of Critical Thinking

Skills constitute the cognitive core of critical thinking and represent the operational foundation through which processes of analysis, interpretation, and evaluation of information are carried out. These skills enable individuals to organize data, examine arguments, and formulate well-founded judgments, thereby configuring a rationality oriented toward problem solving and informed decision-making. In this sense, critical thinking skills are not reduced to isolated

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technical abilities, but rather form an interconnected system of mental operations that makes possible a rigorous and coherent understanding of the phenomena under analysis.

One of the most influential frameworks for the systematization of these skills is the Delphi Report developed by the American Philosophical Association, which identifies six core competencies that structure critical thinking: interpretation, analysis, evaluation, inference, explanation, and self-regulation [5]. These competencies allow individuals to understand the meaning of available information, break it down into its essential components, assess its credibility, draw reasoned conclusions, justify their judgments, and consciously review their own cognitive processes. Taken together, this framework provides a widely accepted cognitive architecture for understanding how critical thinking operates in academic and professional contexts.

Nevertheless, specialized literature has shown that the classification and scope of these skills may vary according to formative purposes and the educational contexts in which they are applied. This conceptual diversity led to processes of synthesis and validation promoted by international panels of experts, which reaffirmed the six competencies proposed by Facione as the most consolidated international reference [2]. On the basis of this consensus, subsequent studies have proposed reorganizations aimed at facilitating didactic and evaluative implementation without undermining the epistemological foundations of the model.

Within this line of inquiry, Mahmood [28]. proposes grouping critical thinking skills into four operational axes: analysis, inference, evaluation, and decision-making, with the aim of simplifying their application in teacher education and educational research contexts. This reorganization does not eliminate competencies, but rather articulates them into broader cognitive processes that favor their transfer to real teaching and learning situations. Complementarily, Saiz and Rivas [29], argue that the development of critical skills should be explicitly oriented toward transfer, avoiding the confinement of their exercise to decontextualized academic tasks or purely theoretical practices.

From a similar perspective, Thomas and Lok [13], suggest organizing critical thinking skills into three functional clusters: reasoning, evaluation, and self-regulation. This proposal facilitates a more precise approach for research and assessment purposes, as it allows for the analysis of how individuals reason about information, how they evaluate the quality of arguments, and how they consciously regulate their own thinking processes. Such an organization reinforces the idea that critical skills do not operate linearly, but rather as a dynamic system of cognitive feedback.

Finally, following Carracedo [30], these skills may be understood as part of three fundamental cognitive processes: problem solving, decision-making, and reasoning. This articulation integrates the different competencies identified in the literature and makes it possible to conceive critical thinking as an action-oriented practice in which reflective analysis is translated into reasoned judgments and responsible decisions. Within this framework, critical thinking skills strengthen both autonomous learning and well-grounded professional practice

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by providing rational criteria for addressing complex situations and evaluating their potential consequences.

3.5.2. Dispositions of Critical Thinking

Dispositions constitute the attitudinal and ethical dimension of critical thinking, insofar as they reflect the individual's willingness to activate and apply cognitive skills in real-life situations. Unlike skills, which refer to knowing how to act, dispositions relate to the willingness to act, that is, to the internal orientations that regulate intellectual conduct in relation to knowledge, uncertainty, and decision-making. From this perspective, critical thinking is not reduced to the formal possession of cognitive capacities, but depends on the effective disposition to employ them in a deliberate, reflective, and context-sensitive manner.

Among the fundamental dispositions is intellectual perseverance, understood as a sustained commitment to rigorous analysis even in scenarios characterized by complexity, ambiguity, or the absence of immediate answers. This disposition enables individuals to resist the excessive simplification of problems and to sustain prolonged processes of inquiry, a condition that is indispensable for deep understanding and the formulation of well-grounded judgments. Closely related to this is intellectual humility, which involves recognizing the limits of one's own knowledge, accepting the possibility of error, and remaining open to the critical revision of one's beliefs in light of new evidence or more robust arguments.

Intellectual empathy constitutes another central disposition of critical thinking, as it facilitates the understanding of divergent perspectives and respectful dialogue with alternative positions. This orientation does not entail abandoning one's own judgment, but rather a willingness to grasp the foundations of different arguments, evaluate them using rational criteria, and situate them within their epistemological and cultural contexts. In this sense, intellectual empathy broadens the individual's interpretive horizon and strengthens reasoned deliberation in contexts of cognitive plurality.

Added to these dispositions is intellectual inquisitiveness, understood as a constant motivation to inquire, expand available knowledge, and update the conceptual frameworks that guide analysis. This disposition drives the active search for information, the critical selection of sources, and the integration of new knowledge into broader reflective processes, thereby preventing the crystallization of unexamined certainties. Likewise, intellectual autonomy is configured as a disposition oriented toward responsibility in judgment formation, insofar as individuals assume the task of evaluating beliefs and arguments independently, without subordinating their reasoning to external pressures, unquestioned authorities, or unexamined consensus [10].

Taken together, these dispositions configure an open, reflective, and ethically oriented form of critical thinking that is not limited to cognitive procedures, but integrates values and attitudes that guide responsible intellectual action. From this standpoint, critical thinking is articulated with an ethics of knowledge that demands coherence among reasoning, evidence, and conduct, thereby strengthening the quality of judgment and the legitimacy of the decisions adopted [7].

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The contributions of Facione [5], Paul [6], and Martínez et al.[10]. converge in emphasizing that dispositions carry a weight equivalent to that of cognitive skills when considering an individual as a critical thinker. In general terms, dispositions may be understood as the degree of inclination a person exhibits to put a thinking skill into practice when the situation demands it, beyond merely possessing that skill in formal terms [8]. Along the same lines, Rear [9], argues that critical thinking should be conceived not only as a cognitive competence, but also as a deliberate attitude in which individuals consciously decide whether or not to apply this type of reasoning within a given context.

3.5.3. The Role of Knowledge in the Configuration of Critical Thinking

Knowledge constitutes one of the structural axes of critical thinking, as it provides the content upon which cognitive skills and intellectual dispositions are activated and articulated. From an epistemological perspective, the relationship between knowledge and critical thinking is one of interdependence, since critical reasoning cannot occur in the absence of information, conceptual frameworks, and prior knowledge that give meaning to analysis. Within this framework, knowledge is not conceived as a static repository of data, but rather as a dynamic resource that guides understanding, orients interpretation, and enables the formulation of reasoned judgments [12].

Thinking critically entails operating on specific content situated within concrete disciplinary and problem-based contexts. Consequently, critical thinking cannot be understood as an autonomous capacity detached from knowledge, but as a cognitive practice nourished by accumulated knowledge and the individual's intellectual experience. Halpern [11], argues that the exercise of critical thinking requires a sufficient level of knowledge and intellectual maturity to analyze complex information, interpret ambiguous situations, and evaluate arguments according to criteria of coherence and relevance. Without a solid knowledge base, critical skills lack support and intellectual dispositions lose effectiveness in decision-making and problem-solving processes.

Specialized literature makes it possible to distinguish three fundamental components of knowledge that intervene in the configuration of critical thinking. First, general information and basic data constitute the initial input that enables elementary evaluations and the formulation of preliminary judgments. This level of knowledge allows for the identification of facts, the recognition of patterns, and the generation of guiding questions for analysis, although it is insufficient to address highly complex problems unless articulated with other levels of knowledge.

Second, specific knowledge, closely linked to the disciplinary field and the context in which analysis takes place, plays a central role in the exercise of critical thinking. This type of knowledge provides the concepts, theories, and criteria intrinsic to each discipline, thereby preventing decontextualized or superficial interpretations. Disciplinary specificity ensures that critical reasoning remains relevant, rigorous, and aligned with the epistemological standards of the field in which knowledge is produced [13].

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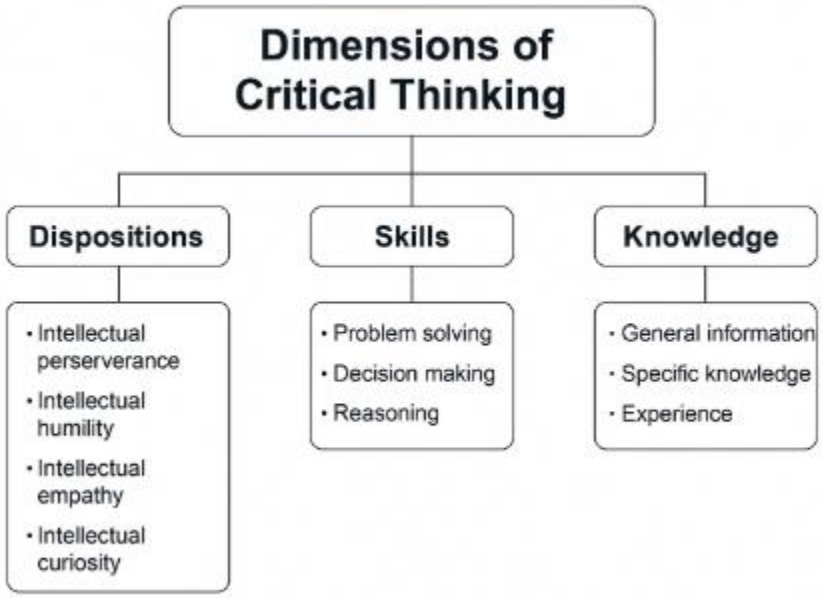
Third, experience is configured as an integrative component that articulates formal knowledge with the individual's personal, academic, and professional experiences. Experience contributes practical referents that enrich critical reasoning, facilitate the anticipation of consequences, and enable the evaluation of the applicability of formulated judgments. In this sense, experience does not replace theoretical knowledge, but complements and contextualizes it, expanding analytical capacity and enhancing the quality of decision-making.

These three components interact dynamically within critical thinking. Cognitive skills make it possible to process, organize, and evaluate available information; intellectual dispositions motivate its ethical, responsible, and reflective application; and knowledge provides the content that gives depth and coherence to reasoning. From this interaction emerges a situated form of critical thinking capable of producing well-grounded conclusions and informed decisions in personal, academic, and professional contexts.

Consequently, the role of knowledge in the configuration of critical thinking is irreplaceable. There is no criticality in a vacuum, nor rigorous reasoning without meaningful content upon which to operate. Recognizing this relationship makes it possible to move beyond reductionist approaches that conceive critical thinking as a generic skill and reaffirms the need to strengthen disciplinary knowledge and formative experience as essential conditions for the full exercise of criticality. From this perspective, critical thinking is consolidated as an integral intellectual practice that articulates knowledge, judgment, and action in the validation of knowledge [12]-[13]-[14].

Concept Map: Dimensions of Critical Thinking



Source: (Martinez et al., 2025)

4. Discussion

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The findings of this study support the view that critical thinking operates as an epistemological and ethical rationality that organizes the individual's relationship with knowledge, rather than as a set of instrumental skills or a school-based ability confined to specific academic exercises. When conceived as a process oriented toward structuring, analyzing, and articulating ideas in a logical and reflective manner, it becomes evident that its central function does not lie in the mere expression of opinions, but in the production of judgments with claims to validity, that is, statements that can be justified, contrasted, and revised. This interpretation is reinforced by the etymological roots of the concept, which link the act of thinking to the capacity to discern and judge, positioning critical thinking as a practice of reflective differentiation that filters, hierarchizes, and examines the components of reality before adopting an argued stance [1]-[2].

Consistent with this reading, the purpose of critical thinking emerges as clearly oriented toward the validation of knowledge rather than toward discursive sophistication. The emphasis on systematic observation, empirical experience, source comparison, and, when required by the context, the application of the scientific method, allows critical thinking to be interpreted as a function of epistemic self-regulation that disciplines the formation of statements and constrains interpretive arbitrariness. From this perspective, criticality is not equated with a stance of permanent suspicion, but is configured as a rational regulation of certainty that avoids both paralyzing skepticism and the uncritical acceptance of socially naturalized claims. Within this framework, the ethical dimension of critical thinking does not appear as a normative add-on, but as an inherent consequence of its epistemological logic, insofar as responsible judgment demands relevant evidence, reasoned contrast, and recognition of one's own biases [3]-[1]-[10].

The discussion of the formative benefits of critical thinking further deepens this understanding. The results indicate that criticality is not innate, but rather cultivable, which shifts the emphasis from individual capacities to the pedagogical and cultural conditions that enable its development. Scientific and humanistic reading, dialogue with diverse perspectives, and exposure to alternative interpretive frameworks emerge as key devices that expand the individual's cognitive horizon and strengthen intellectual autonomy. This interpretation is particularly relevant because it shows that critical thinking is not built through the accumulation of information, but through reflective interaction with knowledge, and because it links its development to ethical decision-making in complex scenarios marked by uncertainty, social pressure, and cognitive biases [10]-[12]-[14]-[15]-[16]-[17].

With regard to the characteristics of critical thinking, the findings allow it to be characterized as a stable intellectual habit rather than as an episodic cognitive event. Objectivity is interpreted as a regulative ideal that requires self-reflection and the conscious management of biases, avoiding both the illusion of absolute neutrality and a relativism that renounces criteria of validity. Likewise, rigorous observation, analytical capacity, intellectual inquiry, and continuous reflection consolidate a revisable rationality in which conclusions remain open to reformulation in light of new evidence or more robust arguments. This dialogical dynamic confirms that the rigor of critical thinking is not measured by conceptual rigidity, but by

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argumentative coherence, contrastability, and a disposition toward rational revision [10]-[21]-[22]-[23]-[24].

The scope and implications of critical thinking further reinforce its social and formative projection without turning it into an ideological slogan. Its connection with creativity makes it possible to understand that criticality is not limited to a logic of questioning, but includes a reconstructive dimension oriented toward the generation of alternatives and the transformation of complex problems. In organizational and professional contexts, the relationship between critical thinking, decision-making, and responsible leadership highlights its relevance for anticipating consequences, evaluating courses of action, and reducing errors derived from cognitive biases. In the contemporary digital environment, its role in addressing misinformation acquires central interpretive weight, as critical thinking is configured as a form of epistemic immunity that promotes verification, source comparison, and differentiation between reliable information and misleading content [26]-[27]-[28]-[10]-[16]-[17].

The discussion reaches its highest analytical density when considering the dimensional structure of critical thinking as an integrated system of skills, dispositions, and knowledge. This understanding makes it possible to argue that criticality cannot be reduced to an inventory of cognitive competencies, since its effective exercise depends on the interaction between knowing how to act, being willing to act, and knowing what one is acting upon. The skills identified in the Delphi framework provide a widely validated cognitive architecture, but their actual activation requires ethical dispositions such as perseverance, intellectual humility, empathy, and autonomy of judgment. At the same time, disciplinary knowledge and experience supply the indispensable content that prevents critical reasoning from operating in a vacuum. Taken together, these dimensions configure a situated rationality that integrates content, judgment, and conduct, which explains why intellectual maturity conditions the quality of critical thinking [10]-[11]-[16]-[17]-[18]-[26]-[27]-[28]-[30]-[31].

On the basis of these elements, the position advanced here is that critical thinking should be understood as an integral competence of knowledge governance that is indispensable for contemporary higher education. Reducing it to classroom techniques or to decontextualized lists of skills produces a simulation of criticality that may serve assessment purposes, but remains insufficient for academic, professional, and civic formation. By contrast, when the cognitive dimension is integrated with ethical dispositions and situated knowledge, critical thinking becomes a tool for intellectual autonomy and social transformation, capable of sustaining responsible deliberative processes in contexts of high epistemological and social complexity.

5. Conclusions

The interpretive analysis developed in this study leads to the conclusion that critical thinking cannot be adequately understood as an instrumental skill or as a decontextualized transversal competence, but rather as an epistemological rationality that governs the individual's relationship with knowledge. From this perspective, critical thinking is configured as a principle of validation that regulates the production, acceptance, and revision of statements,

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enabling the formulation of judgments with claims to validity grounded in evidence, argumentation, and source comparison. This understanding expands its formative scope and positions critical thinking as a structural component of contemporary higher education, particularly in contexts characterized by information overload, the circulation of polarized discourses, and the fragility of prevailing criteria of truth.

The findings confirm that the purpose of critical thinking is not limited to improving academic performance or enhancing argumentative sophistication, but is instead oriented toward the epistemic and ethical self-regulation of judgment. Thinking critically involves disciplining inference, recognizing the provisional nature of knowledge, and assuming intellectual responsibility for sustaining claims that are justifiable, contrastable, and open to revision. In this sense, criticality is configured as a reflective balance between paralyzing skepticism and the uncritical acceptance of socially naturalized beliefs, reaffirming its ethical dimension as an inherent consequence of its epistemological logic rather than as an external normative addition.

The study also concludes that critical thinking is a constructed formative competence rather than an innate attribute, which shifts the emphasis from individual abilities to the pedagogical, cultural, and curricular conditions that make its development possible. Systematic exposure to diverse perspectives, engagement with scientific and humanistic reading, the analysis of controversies, and reasoned dialogue emerge as fundamental mediations for expanding the individual's interpretive horizon and strengthening intellectual autonomy. This finding is particularly relevant for higher education, as it demonstrates that criticality is cultivated through deliberate formative practices rather than through the mere accumulation of information or the mechanical application of cognitive techniques.

With regard to its characteristics, the study allows critical thinking to be characterized as a stable intellectual habit rather than as an occasional cognitive event. Objectivity is redefined as a regulative ideal that requires self-reflection and the conscious management of one's own biases, while rigorous observation, systematic analysis, intellectual inquiry, and continuous reflection constitute an open, revisable, and dialogical cognitive dynamic. This conception avoids both the myth of absolute neutrality and epistemological relativism, and locates critical rigor in argumentative coherence, contrastability, and a sustained disposition toward rational revision of judgment.

The scope of critical thinking extends beyond the individual level to encompass social, organizational, and democratic dimensions. Its connection with creativity, strategic decision-making, responsible leadership, and resistance to misinformation demonstrates that criticality functions as a form of epistemic immunity against persuasive discourses lacking sufficient grounding. In contemporary digital contexts, this function acquires particular relevance, as it enables the differentiation of reliable information from misleading content and supports ethical and responsible information consumption practices, thereby contributing to the strengthening of public deliberation.

One of the main contributions of this study to new knowledge lies in the interpretive systematization of critical thinking as an integrated structure of skills, dispositions, and

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knowledge, understood not as a sum of isolated components, but as a dynamic and interdependent system. This reading makes it possible to move beyond reductionist approaches focused exclusively on cognitive skills and proposes a re-signification of critical thinking as a form of knowledge governance. From this analytical category, new possibilities emerge for rethinking its teaching, assessment, and ethical relevance in higher education, providing a solid conceptual framework for curricular design and research training.

From a pedagogical standpoint, the conclusions suggest that fostering critical thinking requires the simultaneous integration of cognitive, dispositional, and epistemic dimensions, avoiding their fragmentation into decontextualized lists of skills. The formation of critical thinkers entails the creation of educational scenarios that legitimize informed doubt, reasoned contrast, and the revision of beliefs, thus promoting the development of individuals capable of responsible deliberation in contexts of uncertainty and controversy.

Finally, it is concluded that critical thinking, conceived as an integral competence for knowledge validation, constitutes an indispensable pillar of contemporary university education. Its development contributes to intellectual autonomy, ethically responsible decision-making, and the strengthening of more reflective, informed, and democratic societies. In this sense, the study not only reaffirms the relevance of critical thinking, but also proposes an epistemological re-signification that positions it as a central formative practice for addressing the cognitive, ethical, and social challenges of the twenty-first century.

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